BETT BUILDINGS ENERGY TECHNOLOGY TRANSFER PROGRAM

TTEB PROGRAMME DE TRANSFERT DE LA TECHNOLOGIE DE L'ENERGIE DANS LES BATIMENTS

Needs and Available Training in Energy Efficient Operation of Apartment Buildings

A RESEARCH REPORT

Canada

87-04698/

Needs and Available Training in Energy Efficient Operation of Apartment Buildings

A RESEARCH REPORT

Sponsored by the
Energy Conservation Branch
Energy, Mines and Resources Canada

Prepared by
Energy Systems Centre
Ontario Research Foundation

Engineering Interface Limited
Willowdale, Ontario

Mel A. Shear and Associates
Downsview, Ontario

February 1985

BETT Publication No. 84.04

The Buildings Energy Technology Transfer (BETT) Program of Energy, Mines and Resources Canada has been created to assist building owners, users, and practitioners active in the design, construction, and operation of buildings in identifying technical obstacles to energy conservation. Through a nationwide network of research agencies and private sector consultants, BETT carries out research and development projects and provides the audiences mentioned above with technical reports, how-to manuals, training manuals, audio-visual aids and data bases.

For further information on the BETT Program please contact:

The Buildings Energy Technology
Transfer (BETT) Program
Energy, Mines and Resources Canada
580 Booth Street
Ottawa, Ontario
K1A 0E4

This report was sponsored under the BETT Program of the Department of Energy, Mines and Resources. The conclusions and opinions expressed herein are those of the authors. The report is distributed for information purposes only and does not reflect the views of the Government of Canada nor constitute an endorsement of any commercial product or person. This report is not intended to take the place of an applicable code or standard.

Neither Canada nor its ministers, officers, employees, or agents makes any warranty as to the accuracy or completeness of the report or its suitability for the purposes of the audiences mentioned above, or assumes any liability arising from the use of any information provided in this report.

© Her Majesty in right of Canada, 1986

Cat. No. M91-3/84-04E
ISBN 0-662-14651-4

ABSTRACT

The success of both day-to-day operations and maintenance and an energy management program in the multiple dwelling sector requires that all staff members (property managers, operators and technical support) have the necessary know-how and take appropriate actions in energy-related areas.

This report defines the energy-related functions (responsibilities and actions) of property managers, operators and technical staff in the high-rise apartment sector and provides guidance for evaluating their performance.

From the definition of responsibilities and actions, it was possible to develop what each staff members needs to know to undertake his duties effectively.

The needs identified above were then matched to the existing training programs available in Canada. Where gaps existed, alternatives to formal programs were developed.

The functional framework and training alternatives developed were reviewed with owner/managers in the apartment sector for their input and comment.

The investigation concludes that energy conservation through better operations and maintenance and energy management programs, cannot be achieved without first establishing an effective functional framework in the apartment sector.

RÉSUMÉ

Dans le secteur des habitations multifamiliales, l'exploitation et l'entretien quotidiens, comme tout programme de gestion de l'énergie d'ailleurs, ne peuvent réussir que si tout le personnel (gérant, exploitant et soutien technique) a les compétences nécessaires et prend les dispositions voulues pour régir la consommation d'énergie.

Les auteurs du présent rapport ont donc défini les fonctions, c.-à-d. les responsabilités et activités, des gérants, des exploitants et du soutien technique des tours d'habitation et fait des recommandations sur la façon d'évaluer le rendement de ces gens.

Partant de ces définitions, ils ont établi les compétences nécessaires à chacun pour fonctionner avec efficacité, puis ils ont concilié les besoins ainsi révélés avec les programmes de formation existant au Canada. Le cas échéant, ils ont ensuite comblé les lacunes des programmes structurés par de nouvelles formules d'apprentissage.

Le cadre fonctionnel suggéré et les divers modes de formation mis au point ont alors été présentés à des propriétaires et gérants d'immeubles d'appartements, aux fins d'examen et de commentaire.

Il semble de fait qu'on ne peut espérer économiser l'énergie dans le secteur des tours d'habitation, en améliorant l'exploitation et l'entretien ou la gestion de l'énergie, sans y avoir d'abord établi un cadre fonctionnel efficace.

Le lecteur trouvera un sommaire du présent rapport, en français, à la page i.

TABLE OF CONTENTS

	SOMMAIRE	i
1.	INTRODUCTION	1
	1.1 Objectives	1
	1.2 How the Information was Developed	2
2.	DEFINITION OF STAFF ROLES	4
	2.1 Background	4
	2.2 Energy-Related Responsibilities	5
	2.2.1 Property Manager	5
	2.2.2 Building Operator/Superintendent	6
	2.2.3 Technical Support Staff	6
	2.3 Energy-Related Actions -- Operation and Maintenance	7
	2.4 Energy-Related Actions -- Energy Management Programs	13
	2.5 Evaluating Staff Performance	13
3.	WHAT STAFF MEMBERS NEED TO KNOW	19
	3.1 Property Manager	19
	3.2 Building Operator/Superintendent	20
	3.3 Technical Support Staff	21
4.	ENERGY RELATED TRAINING FOR THE BUILDING OPERATION AND MANAGEMENT INDUSTRY	22
	4.1 Review of Existing Training/Educational Programs	22

TABLE OF CONTENTS (continued)

4.2 Match of Existing Programs to the Needs 23

4.2.1. Nature, Availability, Timing and Cost 23

4.2.2 Suitability of Content to the Needs 24

4.2.2.1 Property Managers 24
4.2.2.2 Building Operators 26
4.2.2.3 Technical Support Staff 28

4.3 Alternatives to Existing Training Programs 30

5. OWNER/MANAGER INPUT/COMMENT ON TRAINING ISSUES 33

5.1 Energy-Related Functions/Actions 33

5.2 Awareness of Existing Training Programs 35

5.3 Owner/Manager Responses to Alternative Training Programs/Approaches 36

5.4 Owner/Manager Recommendations for Future Training 39

5.5 Owner/Manager Responses to Other Related Issues 40

6. CONCLUSIONS 42

6.1 Definition of Staff Roles 42

6.2 What Staff Members Need to Know 42

6.3 Match of Existing Training Programs to the Needs 44

6.4 Alternative Approaches to Training 44

7. RECOMMENDATIONS 46

APPENDICES

1. Staff Responsibilities A-1

2. Critiqued Directory of Existing Training (Education Programs) B-1

LIST OF TABLES

TABLE 2.3	Energy-Related Operation and Maintenance Functions	8
TABLE 2.4	Energy Management Program Functions	14
TABLE 2.4.1	Retrofit Energy Measures	16
TABLE 4.1	Match of Existing Training to Needs: Property Manager	25
TABLE 4.2	Match of Existing Training to Needs: Building Operator	27
TABLE 4.3	Match of Existing Training to Needs: Technical Support Person	29
TABLE 6.2	What Staff Members Need to Know	43

Conclusions de l'étude :

- Les fonctions attribuées aux gérants, exploitants et soutien technique des tours d'habitation par les responsables du projet tracent pour ainsi dire le cadre le plus propice à l'optimisation de l'emploi d'énergie dans ce secteur.

- La gestion des immeubles d'appartements semble, en général, fonctionner par crises. De toute évidence, on a de la difficulté à gérer son temps : personne ne prend le temps de dresser des plans, de fixer des objectifs au personnel, d'établir la charge de travail, de déléguer les responsabilités ou de tenir des dossiers, pour faciliter l'exploitation quotidienne. Si les entreprises examinées se fixaient des objectifs, elles pourraient consacrer plus de temps à la gestion de l'énergie.

- Ni l'amélioration des procédés d'exploitation et d'entretien ni la définition de mesures complémentaires d'optimisation ne sauraient permettre d'économiser l'énergie si l'on n'établit pas d'abord dans le secteur un cadre fonctionnel efficace.

- Étant donné les contraintes existant dans le secteur au plan de l'accessibilité, du coût, de la nature (les intéressés montrant en effet une préférence marquée pour les cours par correspondance) et de l'horaire des cours, très peu de programmes offerts par les collèges communautaires et les instituts techniques semblent répondre aux besoins des gérants et exploitants d'immeubles et du personnel de soutien technique.

  De fait, il y en a seulement deux, qui sont l'un et l'autre donnés par le Southern Alberta Institute of Technology. Ce sont :

  * le "Building Systems Administrator" et
  * le "Basic Building Operation".

  Divers programmes (dont certains de type coopératif) offerts par les collèges communautaires mènent à un diplôme en gestion de l'énergie ou en technologie des systèmes énergétiques. Ces programmes répondent à une bonne part des besoins du personnel de soutien technique et pourraient procurer aux firmes de gestion immobilière les compétences dont elles ont besoin.

Recommandations :

- Il conviendrait de compléter le travail entrepris ici, pour établir une grille utile des fonctions et activités indiquées dans le secteur des immeubles d'appartements, en menant un sondage auprès d'un plus grand nombre de propriétaires et gérants ayant mis des programmes semblables sur pied (et semblant parvenir à diminuer leurs frais d'exploitation et d'entretien). Dans ce cas seulement pourra-t-on remplacer la gestion par "crises" par une gestion par "objectifs".

  Cette recommandation est d'ailleurs étayée par le fait que sept propriétaires et gérants estiment qu'une meilleure définition du rôle des responsables de la gestion de l'énergie et de l'exploitation et de l'entretien permettrait d'économiser plus d'argent (et d'énergie).

- Il faut examiner plus en détail les programmes qui semblent répondre aux besoins connus des gérants, des exploitants et du personnel de soutien technique des tours d'habitation (et qui sont tous deux offerts par le Southern Alberta Institute of Technology (SAIT), sous forme de cours par correspondance). Les données obtenues au cours du projet permettent en effet de cerner les sujets traités, mais non la matière exacte de ces cours.

- Il faudrait encourager les diplômés de cours à temps plein en gestion de l'énergie ou en technologie des systèmes énergétiques des collèges communautaires du Canada à chercher un emploi auprès de firmes de gestion immobilière.

- Les firmes de gestion immobilière devraient envisager d'embaucher des étudiants inscrits à des programmes coopératifs de gestion de l'énergie ou de technologie des systèmes énergétiques. Ces derniers auraient ainsi l'occasion d'acquérir une expérience pratique dans le secteur des habitations multifamiliales, tandis que les firmes les embauchant pourraient, à frais relativement peu élevés, voir s'il est avantageux pour elles de se procurer de telles compétences.

- Les montages audio-visuels (et les manuels complémentaires) décrits sous la rubrique "Alternative Approaches to Training" pourraient être distribués contre remboursement aux conseillers en gestion immobilière et firmes de ce secteur, partout au Canada (comme l'a recommandé plus d'un propriétaire et gérant).

- On pourrait, dans diverses régions du Canada, former spécialement des conseillers en gestion de l'énergie, afin qu'ils tiennent lieu de personnes-ressources et aident à présenter et à interpréter les montages à ce propos. Il incomberait aux propriétaires immobiliers ou aux firmes de gestion immobilière de défrayer ces conseillers.

1.0 INTRODUCTION

A recent BETT task ('Energy Conservation Technology Transfer for Multiple Dwellings: Needs and Opportunities') identified the expressed need for training for:

* superintendents
* property managers
* technical support staff

on a variety of topics relating to energy conservation (both design and operation) in buildings in the apartment sector.

An Apartment Owner's Handbook is planned; one section of which will deal with the training needs of property managers; technical staff and superintendents relating to energy conserving operation, and maintenance of apartment buildings. The section will also describe the roles of the above players should play in planning and implementing an energy management program.

1.1 Objectives

The principal objective of this task is to produce the 'Training' section of a planned apartment Owners Handbook. A secondary objective is to provide BETT with recommendations as to what role(s) it could play in training of property managers, technical staff and superintendents in the multiple dwelling sector.

The scope of the project encompasses the proposed content of the 'training' section of the manual. The following are the issues as perceived by the owner and hence are to be developed and elaborated on in this task:

* What are the energy related responsibilities/ functions and actions of my property manager(s), superintendent(s) and technical staff?

* What is the 'lost' opportunity/economic benefit resulting from my staff's inability/ lack of knowledge in energy related matters?

* What should my staff members know about building energy systems with respect to operation, maintenance, auditing, retrofit measures and tracking energy consumption?

* How can I evaluate my staff's performance in energy related areas (described above) and hence assess their requirements for training or upgrading?

* What training programs are available and are they suited to my staff's needs?

* Are there any alternatives to formal training programs perhaps more suited to my staff's needs?

* Where can I obtain further information on the above issues?

1.2 How the Information was Developed

The Energy Systems Centre, Ontario Research Foundation, assembled a team with broad experience in both property and energy management in the apartment building sector.

Mel Shear, Mel Shear and Associates, developed the information on the responsibilities or functions of each of the building team members. He provided this not only for energy related areas but also for each individual's total responsibility/function.

An extensive survey of existing educational and training programs was undertaken. The content of the programs was compared with the training needs as developed by the project team and the gaps noted. In addition, the project team developed a number of alternatives to 'existing' programs which were deemed to more closely meet the needs of the players in the apartment sector.

The above information formed the basis for an interview process with owners and property managers. Their comments/input were sought on the issues relating to the training needs of property managers, superintendents and technical staff. As well, information developed in this task was reviewed with them before being finalized to achieve a consensus on the definition of the various players' responsibilities/functions and actions in areas impacting on energy use, (i.e. operation, maintenance and energy management).

2.1 Background

Before an owner can determine whether or not his staff needs training in energy related areas, he must first:

* define the overall responsibilities/function of each staff member

* identify the actions which follow from the definition of responsibility/function

and then:

* identify what each staff member needs to know to effectively undertake actions identified

For the purposes of this report, there are three players, or groups of players, whose roles will later be defined; these are:

* property manager

* building operator/superintendent

* technical staff

Whether one or more of the above exist within an owner's staff will obviously depend on the size of the building or portfolio. The classifications identified above would likely be present in the case of large building portfolios.

For smaller portfolios, there may be no technical staff; in which case the property manager might assume this responsibility. He would hire outside contractors and consultants as needed.

Another variation would be where there is an on-site owner/manager responsible for all functions and actions related to the building.

For the purposes of this report, the large portfolio is assumed. That is, the owner has a property manager assisted by technical support staff and a superintendent (building operator) living in each building in question. Both the property manager and technical support staff are likely to be responsible for more than one building. Where the reader has combined functions, he is asked to extract relevant information, as appropriate, from other functions.

2.2. Energy Related Responsibilities

This section will outline the responsibilities of each of the players or groups, as identified above, concentrating, in the body of the report, on energy related areas. For a full description of responsibilities, see Appendix 1.

2.2.1 Property Manager

Responsibilities:

1. To obtain from the owner approval for funding and the mandate for implementing (including manpower allocations), an energy management program.

2. To reduce the consumption of energy to its lowest cost-justified level - thereby maximizing income or reducing subsidies (public housing) in his/her building portfolio.

3. To achieve this energy consumption reduction without downgrading or affecting adversely:

   * the structure

   * the electrical/mechanical systems

   * the ambience and comfort of the tenants and/or occupants (hence, maintaining the owner's reputation for quality and integrity)

   while using a minimum of time, dollars, tools, equipment, ideas, people and space.

4. To maintain the energy savings achieved by establishing an effective monitoring and maintenance program.

5. Recruit, hire, motivate, train, assess performance and upgrade building staff as necessary, to ensure the success of the energy management program.

2.2.2 Building Operator/Superintendent

Responsibilities:

1. To operate and maintain the assigned building and its electrical/mechanical systems according to the Building Maintenance and Energy Management program standards and objectives as established by the owner/manager. Seek training and upgrading from the owner/manager where needed.

2. To identify problems associated with electrical/mechanical systems operation; if unable to correct, report the problem to the owner/manager.

3. To respond promptly to tenant maintenance requests; to correct, if possible, if not, to report the problem to the owner/manager.

2.2.3 Technical Support Staff

Responsibilities:

1. To provide housekeeping, structural or electrical/mechanical support services to owners and managers of buildings.

2. To identify the people needed for their particular area of services expertise, their goals, objectives and their functional accountabilities.

3. To research and work very closely with building owners and managers to assure that they are developing and providing the right kind of support services for the buildings being managed.

4. To keep up-to-date on the latest products, materials, services, tools, equipment, parts and service contracts and recommend them to the manager.

5. To provide information needed for the owner or manager to make informed decisions regarding on-going maintenance and specific energy conservation measures.

6. To implement energy conservation measures under the direction of the property manager.

2.3. Energy-Related Actions - Operation and Maintenance

The definitions of responsibilities by themselves do not provide a complete picture of the on-going activities which the property manager, building operator/superintendent and technical staff should be involved in.

For that reason, the authors, from their experience in property management and energy management activities, have developed a comprehensive tabulation of energy related actions in operation and maintenance.

This is organized and presented in Table 2.3 such that it is possible to see the apartment team interaction, as well as the specific actions of each member's operation and maintenance activities.

The systems areas covered include:

* boilers
* heating system
* ventilation
* building envelope
* domestic hot water
* garage heating and ventilation
* lighting
* appliances
* water use
* snow melting
* swimming pool heating and ventilation
* 'tracking' energy use
* miscellaneous

TABLE 2.3: ENERGY RELATED OPERATION AND MAINTENANCE FUNCTIONS

Energy Related Activity	Owner/Property Manager	Building Operator	Technical Support Staff (In-House or Outside)
BOILERS			
Burner service and efficiency Report	Provide guidelines for service/efficiency report to operator. Secure outside services (full maintenance contract). Inform building operator of service schedcule	Monitor the activity of service contractor. E nsure the service/efficiency report is completed by service contractor	Undertake service as estab lished by contract
Control Adjustments/ settings	Assign responsibility. Review monthly to ensure operator understanding	Fill in boiler log daily. Report any unusual condition	Install controllers. Service controllers. Callibration
HEATING SYSTEM			
Water treatment (problem area)	Establish the tolerances/ criteria for tests. Review water tests for normalcy	Monitor the activity of contractor. Ensure the spec. sheet is completed as required	Undertake water tests as directed by property manager
Servicing in-suite radiator valves	Assign responsibility to operator or obtain outside services as appropriate	Check valve operation during in-suite inspection. Service as directed	Provide service as requested/directed by property manager
Bleed air from system (Cushion Tank)	Ensure that cushion tanks or automatic vents are in operation. Provide guidelines to operator	Check that air vents are operating. Report unusual condition	Service or change as necessary
Blanking off /Isolating unnecessary heaters (garages)	Secure outside services		Identify where and undertake as directed by property manager
Monitor/service/adjust indoor/outdoor controls	Develop checklist/ guidelines for operator. Review monthly to ensure operator understanding and operation as designed	Fill in heating performance graph (records outdoor temperature) supply, return and blend temperature. Report unusual condition	Install and service as directed by property manager
VENTILATION			
Raise set point of elevator penthouse fan control (Isolate fan-blank off as alternative)	Identify the need/ opportunity. Obtain advice on proper setting. Provide guidelines to operator	Check and maintain setting as directed	Provide guidelines on proper setting
Shutdown and blank-off local wall fans in winter	Identify the need/ opportunity. Provide guidelines to operator	Shutdown and blank-off wall fans as instructed by property manager	
Install timeclocks to shut-down local fans during quiet periods	Calendarize the setting of the timeclocks. Provide instruction to operator on timeclock settings	Check/maintain timeclock settings as directed	Installation and initial settings of timeclocks

TABLE 2.3 CONTINUED

Energy Related Measure	Owner/Property Manager	Building Operator	Technical Support Staff (In-House or Outside)
Install thermostats to control electrical, mechanical and laundry room fans	Identify the need./ opportunity. Identify outside services to install. Provide instruction to operator on settings	Check/maintain settings as directed	Installation and initial settings of thermostats
Tune make-up air gas furnaces; clean the heat exchanger and service atmospheric burners	Secure outside services (include under full maintenance contract). Provide checklist to operator	Check cleanliness of unit, change filter. Report unusual condition/need for service	Undertake service as established by contract
Service back draft dampers	Identify the need/ opportunity. Obtain outside services. Provide checklist to operator	Check condition of dampers. Report unusual condition/need for service or replace	Service as needed
Seal gaps around ducts at roof	Obtain outside services. Provide checklist to operator	Check condition of flashing/caulking. Report need for sealing	Provide sealing/caulking services
Adjust dampers on recirculating ventilation systems	Identify the need/ opportunity. Obtain outside 'balancing' services. Provide guidelines to operator	Check/maintain damper settings. Report unusual condition	Adjust dampers as directed
BUILDING ENVELOPE			
Close common area windows in winter	Provide guidelines to building operator	Keep common area windows closed as directed	
Servicing windows and doors	Provide checklist to operator. Obtain services as needed to repair or replace	Check condition of windows and doors, weatherstrip as directed. Report need for service	Repair or replace weatherstrip or hardware as directed
Seal cracks and openings in all walls	Provide checklist to operator. Obtain services as needed to seal or caulk	Check/inspect as directed by property manager. Report need for repair	Seal cracks and openings as directed
DOMESTIC HOT WATER			
Lower temperature setting	Identify the need. Obtain outside services to provide advice/undertake adjustments. Provide instruction to operator	Lower temperature setting if directed. Check/maintain temperature setting as directed	Advise property manager of setting(s). Provide instruction/undertake adjustment as directed
Install timeclock to cycle recirculation pump	Identify the need. Obtain outside services to provide advice/undertake installation of timeclock. Provide instruction to operator	Check/maintain timeclock settings as directed	Advise property manager of cost/benefit; appropriate settings. Install timeclock as directed

TABLE 2.3 CONTINUED

Energy Related Measure	Owner/Property Manager	Building Operator	Technical Support Staff (In-House or Outside)
Block pipe riser shafts in top floor ceiling (stop airflow)	Identify the need. Provide checklist to operator. Obtain outside services as needed	Carry out inspection as directed. Report deficiencies to property manager	Block pipe riser shafts as directed
Fix leaking taps	Provide instruction/ checklist for operator's annual suite inspection. Follow-up on deficiencies noted	Repair/replace washers as directed in annual suite inspection. Report other deficiencies	Provide services beyond scope of operator (i.e. other deficiencies)
Add temperature setback control	Identify the need./ opportunity. Obtain outside services to advise /implement DHW setback control. Provide instructions to operator	Check/maintain settings as directed. Report unusual condition	Provide advice to property manager. Install as directed.
GARAGE HEATING AND VENTILATION			
Lower temperature setting	Identify the need/ opportunity. Identify required setting. Instruct operator	Lower setting as directed. Check/maintain setting as directed	Provide instruction of setting
Install thermostat to stop circulation pump in mild weather	Identify the need/ opportunity. Obtain outside services to install thermostat with tamper proof box. Provide guidelines to operator	Check/maintain thermostat settings as directed	Install thermostat. Provide instruction to property manager
Clear obstructions from air make-up openings	Provide checklist to operator	Inspect and clear as instructed	
Switch and blank off unnecessary heaters	Provide instruction to operator. Secure outside services if needed	Switch and blank off as directed	Blank off heaters as directed
LIGHTING			
Install photo cells on outside lighting	Identify the need/ opportunity. Obtain outside services to install. Provide checklist to operator	Check operation. Report unusual condition as directed. Clean the eye as directed	Install photo cells/timeclocks as directed
Install photo cells on daylit stairwells and lobby lighting	Identify the need/ opportunity. Obtain outside services to install. Provide checklist to operator	Check operation. Report unusual condition as directed	Install as directed by property manager

Energy Related Measure	Owner/Property Manager	Building Operator	Technical Support Staff (In-house or outside)
Adjust lighting levels	Identify the need. Obtain outside services where needed. Provide instruction; guidelines to operator	Where directed, install lower wattage lamps. Maintain/replace with same	Install lower wattage lamps as directed
Switch off basement, locker room and party room lights when not in use	Provide guidelines to operator	Ensure common area lights are extinguished when unoccupied	
Clean common area lights	Provide guidelines to operator	Clean common area lights as directed	
APPLIANCES			
Rewire washing machine for cold water rinse	Identify the need. Contact rental company/outside services as appropriate		Rewire machine as appropriate
Shut down laundry room during electrical peak periods	Identify the need. Provide instruction to operator	Close laundry room as directed	
WATER USE			
Fix leaking taps and toilets	Provide instruction to operator. Obtain outside services as needed	Repair as necessary* during annual in suite inspection/as notified by tenant *(replace all washers in suite reseat if necessary)	By services as directed
Water grounds after sunset			
Lower water pressure			
Derate booster pump	Check what was installed. Compare with plans. Identify outside services		Install smaller pump/motor
Monitor Water Consumption	Provide Checklist to operator. Analyze operator recordings	Record reading on daily log. Report unusual condition	
SNOWMELTING			
Install an hour counter	Identify the need. Obtain outside service to install or service as needed	Record hours of heater operation. Report unusual usage	Install hour counter
Relocate switch to facilitate manual control	Identify the need. Arrange for outside services to relocate switch. Develop guidelines for operator	Operate heaters in accordance with guidelines	Relocate switch

TABLE 2.3 CONTINUED

Energy Related Measure	Owner/Property Manager	Building Operator	Technical Support Staff (In-House or Outside)
SWIMMING POOL HEATING AND VENTILATION			
Set back pool water temperature at night	Develop guidelines for operator	Set back temperature as directed (check automatic set back settings)	Installation of automatic set back controls
Install humidity controls on ventilation system	Identify the need. Obtain outside services as required to install. See to service as needed	Check and record control settings. Report abnormal operation	Install humidity controls
Service dampers and clear air intakes and exhausts	Obtain outside services as needed	Clean and inspect as needed. Report need for service	Service dampers
MISCELLANEOUS			
Clean electric eye on garbage compactor	Identify the need. Provide instruction to operator	Clean electric eye as directed	Provide guidance as needed
Install timer on incinerator burner	Identify the need. Obtain outside services to install timer. Provide checklist to operator	Check/maintain timer settings as directed	Install timer as directed
TRACKING ENERGY USE			
Keeping records of energy use	Identify the need. Establish an energy 'tracking' program Provide instruction to operator. Analyze records on regular basis . Instruct operator or outside services as necessary, to correct deficiencies	Keep logs of energy meter readings as directed. Provide logs to property managers as directed. Follow up as directed by property manager	Develop/identify a suitable tracking method. Assist property manager in implementation/ staff training
Energy audit (walk through)	Identify the need. Oversee the preparation for and execution of an energy audit. Review and assess the recommendations of the energy audit report. Assign responsibilities to operator. Develop a more effective maintenance/ operations program. Value analyze retrofit proposals. Obtain approvals from owner	Undertake responsibilities as directed by property manager	Provide energy audit services. Identify/ prioritize energy conservation opportunities. Provide costs/benefits. Implement as directed by property manager

Within each system or area, specific technical measures/activities are identified. It can be generally concluded that if all of these actions were being undertaken, as described, the energy use of the building would be minimized.

As well, it emphasizes the importance and breadth of day-to-day activities which can directly impact on energy use.

2.4. Energy Related Actions - Energy Management Programs

In Table 2.4, the actions of the property manager, building operator and technical staff are described relating to energy management program activities. Specific retrofit measures are summarized in Table 2.4.1. Rather than present activities on a measure-by-measure basis (as in the 'Operation and Maintenance' areas), Table 2.4 describes the process, which is essentially an on-going program of identifying opportunities, and taking appropriate actions to realize the economic benefits.

As with 'Operation and Maintenance' activities, one can clearly see the 'team' interaction as well as the specific actions/responsibilities of each member.

2.5 Evaluating Staff Performance

The definition of staff roles in this section clearly defines the scope of responsibilities and actions of the property managers, technical support staff and building operator in energy related areas.

It then follows, that the position descriptions of the staff should reflect the responsibilities and duties in energy related areas as it already does in areas relating to, for example:

* Occupant Services
* Leasing and Administrative Services
* Maintenance Services

TABLE 2.4: ENERGY MANAGEMENT PROGRAMS FUNCTIONS

Property Manager	Building Operator	Technical Staff
Develop building profiles for each building within portfolio	Assist in developing building profiles as directed by property manager	Assist the property manager in development of building profiles
Review and assess the recommendations of the energy audit report with operator and technical staff (where appropriate)	Attend meeting(s) as directed by property manager	Provide information needed by property manager to make informed decisions regarding specific energy conservation measures
Analyze, prioritize and plan the implementation of operation and maintenance energy measures identified by the energy audit for each building in portfolio		Provide analysis capability where needed by property manager. Develop a prioritized list of O&M measures for review and decision by upper management
Keep operating, maintenance , and technical staff involved with/informed about planned energy measures in their buildings	Keep informed on planned energy measures in building	Meet with O&M staff as directed by property manager. Keep staff informed of planned energy activities
Develop operations budget projections that include the low cost/no cost (operation/maintenance) energy measures		Assist the property manager as requested, with operation budget preparation and planning
Develop a proposal of value analyzed capital expenditures for the more promising retrofit/replacement energy measures. Review with the owner. Initiate the activities needed to schedule and plan retrofits accepted		Undertake cost/benefit analysis of capital expenditure identified by energy audit. Assist property manager with proposals. Plan and schedule those capital measures approved by property manager
Prepare specifications and obtain firm quotations of costs to implement retrofit measure(s)		Develop technical specifications; obtain cost information as needed from suppliers. Advise property manager
Review final proposal with owner before tender		
Call and review tenders. Let contracts for retrofit(s)		Review tenders; provide recommendations to property manager
Assign responsibilities and duties to O&M and technical staff during installation and commissioning of retrofits/replacements in their building(s). Inform tenants	Undertake activities/duties as directed by property manager during installation of retrofits/replacements in building	Assist in definition of roles/responsibilities for operations staff during implementation of retrofits/replacements

TABLE 2.4 CONTINUED

Property Manager	Building Operator	Technical Staff
Arrange for upgrading/training of O&M staff with respect to new system(s) O&M requirements	Attend upgrading sessions as requested. Follow new procedures, inspections and record keeping as directed	Upgrade staff on systems operation, where capable. Seek outside services if necessary
Update building profiles to reflect changes; review and revise planned maintenance program as required	Develop an understanding of responsibilities/actions as laid down in planned maintenance program	Update building profiles as directed by property manager. Undertake revision to planned maintenance program as directed. Inform staff
Establish a 'tracking' or 'monitoring' program to identify savings; compare with projections; initiate corrective action. Assign responsibilities in this area	Attend upgrading/training sessions as directed by property manager. Keep records and report as directed	Identify and review 'tracking' techniques. Establish an inhouse program in concert with property manager. Provide information and instruction to staff as directed.
Keep the owner and other team members involved/informed of energy management goals, activities; responsibilities; problems; achievements	Develop an understanding of the proper operation and maintenance needs of 'new' systems and components. Identify 'unusual' conditions; report problem(s) to property manager	Prepare energy management reports for property manager as directed. Keep property manager informed of problems and achievements

TABLE 2.4.1: RETROFIT ENERGY MEASURES

Boilers

Upgrade firing control: use high efficiency burner; install flue gas heat recovery unit; derate boiler; install turbulators; add sequence control; install high efficiency baseload boiler; install positive flue damper; add electronic ignition; add combustion air trim control.

Space Heating - Hot Water & Steam

Install in suite thermostatic control valves; add solid state or microprocessor based central system controls; change system zoning.

Space Heating - Electric

Add microprocessor based central system controls.

Ventilation

Reduce airflows; install power dampers to prevent backdraft through idle fans; add microprocessor control of multiple central ventilation fans; replace local wall fans with reversible type; install ventilation heat recovery.

Building Envelope

Retrofit replace windows; increase roof insulation; insulate exposed floors; seal against infiltration; install power dampers in smoke relief vents.

Domestic Hot Water

Insulate pipework; install high efficiency boiler; install low flow shower heads.

Garage Heating and Ventilation

Install carbon monoxide sensing control system.

Lighting

Convert indoor fixtures from incandescent to fluorescent; convert outdoor fixtures from incandescent to sodium; add photocell control to outdoor and daylit area lighting.

Appliances

Select more energy efficient appliances at replacement time.

Water Use

Install toilet dams

Snowmelting

Install snow sensing control; cover ramp.

Swimming Pool Heating and Ventilation

Install dehumidifying heat pump; install pool cover.

Miscellaneous

Install compactor and get rid of incinerator.

Once it forms part of the individual's position description, performance in energy related areas can be assessed at the time of annual performance review. The owner will, in most cases, assess the performance of the property manager(s) directly. The responsibility for the performance review of technical support staff and operators could be delegated to the property manager(s) and/or perhaps to a senior individual within the technical support staff.

As to what forms the basis of the performance review, the following suggestions have been developed by the authors:

* Building Inspections: Property managers and/or senior technical support people should carry out periodic site inspections to assess the condition of the structure and electrical/mechanical systems in all the buildings in the portfolio. Only then can the management be satisfied that the operator is performing his duties as directed. It also provides an opportunity to identify, discuss and correct any problems or misunderstandings which the operator might have regarding the building systems' operation and maintenance requirements.

  Following each site inspection (perhaps quarterly) the deficiencies, problems and misunderstandings should be recorded to be later employed to assess whether or not corrections have been made.

* Annual Maintenance and Operation Cost Records:

  Assuming that fairly comprehensive records of repair and maintenance expenses; fuel; water and electricity costs are kept by management, the individual building's performance can be 'tracked' over time. This, together with the site inspections above, provides an effective means of evaluating the staff performance; both the building operator and the technical support staff.

For the above ideas to be both fair to the staff and effective in assessing performance, each staff member needs to have a clear understanding of what the scope of his/her responsibilities and duties are.

From the preceding sections describing the responsibilities and actions of the property manager, operator and technical staff, one can now identify what each needs to know to effectively undertake the actions identified and subsequently reduce apartment building energy use.

3.1 Property Manager

A property manager needs to know how to:

Building Operation and Maintenance

* prepare building profiles, operating and planned maintenance manuals for electrical, mechanical systems
* prepare maintenance schedules and workloads
* prepare, monitor and interpret mechanical/electrical system logs
* prepare annual suite inspection instructions/ checklist
* prepare guidelines for 'look, listen, touch' inspections of electrical, mechanical and structural systems
* prepare logs, monitor and interpret recordings of energy and water consumption

Energy Management in Buildings

* identify opportunities to reduce energy used by electrical/mechanical systems
* review, assess and understand the recommendations of an energy audit
* evaluate, plan, budget and schedule the implementation of operation and maintenance measures identified by the energy audit
* value analyse capital expenditures for retrofit/replacement energy measures

* prepare and present capital retrofit proposals to the owner

* identify and secure outside services

* call and review tenders; let contracts; assign duties and responsibilities for installation and commissioning of retrofits/replacement energy measures

* 'track' and maintain energy savings following retrofit

Supervision

* recruit, hire, motivate, train, upgrade, assess performance of building(s) staff to ensure the success of an energy management program.

3.2 Building Operator/Superintendent

The building operator needs to know how to:

Building Operation and Maintenance

* Carry out 'look, listen, touch' inspections of electrical, mechanical and structural systems

* Identify and report unusual conditions in electrical/mechanical system operation

* Complete operational logs of electrical/ mechanical systems operation

* Check and maintain control and timelock settings on electrical/mechanical systems

* Carry out annual in suite inspections

* Check, clean, maintain, lubricate electrical/ mechanical systems

* Record energy and water meter readings

* Change filters and drive belts

3.3 Technical Support Staff

Members of the technical support staff need to know how to:

Building Operation and Maintenance

* develop and update building profiles
* develop guidelines; checklists or logs; operation and maintenance procedures for building electrical, mechanical and structural systems

Energy Management in Buildings

* evaluate cost/benefit of energy conservation measures (both O&M and retrofit/replacement)
* prepare both O&M and capital budget submissions for energy measures
* develop technical specifications for tenders of energy measures
* evaluate tenders and recommend actions to the property manager
* plan, schedule and undertake (where appropriate) O&M and retrofit energy measures
* develop and implement an energy use accounting or 'tracking' method for an energy management program
* prepare energy management program reports of progress, problems and achievements for upper management

Supervision

* define roles/ responsibilities/actions for staff during implementation of energy measures on an on-going basis
* upgrade operating staff on 'new' system operation and maintenance requirements

A survey was planned and undertaken to identify and review existing educational and training programs in building operations and energy management targetted to property managers, operators and technical support staff in the multiple dwelling sector.

The programs identified were reviewed and summarized with respect to their nature, content, cost, availability and target audience(s) (see Appendix 2).

The content of existing programs was then matched to what each team member needs to know (identified in Section 3). In this way, gaps in training content were identified and alternative approaches and/or content developed.

4.1. Review of Existing Training/Educational Programs

At the outset of the task, through a number of sources, a total of twenty-eight delivery agents (community colleges, institutes, associations, corporations, government agencies and consultants) were identified as offering energy related courses, seminars and educational programs to managers, operators and technical support staff in the apartment building sector.

Of those contacted, eight did not have a program as such or it had been discontinued. Three organizations indicated that their programs were available only to employees and not to the public at large (see Appendix 2).

Of the remaining seventeen, one (British Columbia Housing Management Commission) is planning to implement energy management seminars in 1985. No details are as yet available.

The reader is directed to Appendix 2 which is a Critiqued Directory of the sixteen programs of relevance to the training of operators, managers, and technical support staff.

4.2. Match of Existing Programs to the Needs

The courses and seminars available at the various community colleges, institutes and through consultants were then reviewed in the context of the needs of the apartment sector operators, managers and technical support staff. In addition, the nature, availability, timing and cost are obviously of importance from both the owners and employees perspective. These latter concerns are covered prior to that of content.

4.2.1 Nature, Availability, Timing and Cost

A day course offered at a local community college requires full-time attendance. For future candidate selection, it would be of interest to an owner, but obviously out of the question for upgrading or training of existing staff.

Night courses are of interest, but will not be readily available in all areas. Only in major centres, where community colleges and institutes are located, would night courses be attractive; both to the owner and trainee.

Correspondence courses are available from the Southern Alberta Institute of Technology, located in Calgary. Upgrading one's self by correspondence courses requires rigid discipline but otherwise could be effective. One drawback, however, would be the inability to obtain hands-on experience with energy systems, for example, which would be available to some extent through 'laboratories' and/or work terms for co-operative students. If the owner could provide on-the-job training to supplement a correspondence course, this avenue would be more attractive.

A number of consultants offer seminars and workshops on energy management subjects to property managers, operators and technical staff in the apartment sector. Although effective, cost is a limitation currently to providing this service to private sector owners. Sessions of this nature would not necessarily be geographically limited and would satisfy the concerns mentioned under correspondence (i.e. an opportunity to share experiences with peers and obtain hands-on experience in the presence of an experienced engineer).

A series of video tapes on 'Energy Management for High Energy Use Buildings', prepared by three experienced energy management specialists for Medicine Hat Community College, was identified during the survey. Although not obtained for review purposes, this approach is attractive and would be effective, for example, in support of correspondence courses or as a supplement to other written material, e.g. technical manuals. This approach to training, is, however, costly to produce and is reflected in the cost to the end user (e.g. for the Medicine Hat tapes (11 tapes in total - 6-1/2 hours run time) the price is $2,150). It is unlikely that this approach to training would see widespread use in the apartment sector without some form of subsidization of the production and distribution costs.

4.2.2 Suitability of Content to the Needs

Tables 4.1, 4.2 and 4.3 briefly attempt to summarize the suitability of content of the various programs reviewed to the identified needs of each function. The following sections provide a discussion to accompany the tables.

4.2.2.1 Property Managers

The most promising program (of the few identified) for property managers is in fact that intended for a technical support person (a Building System Technician Diploma or equivalent as a prerequisite) upgraded to a Building Systems Administrator.

PROPERTY MANAGER 'NEEDS TO KNOW' / DELIVERY AGENT 'TRAINING AVAILABLE'	BLDG.OPERATION & MAINT.					ENERGY MANAGEMENT						SUPERVISION					COMMENTS
	BUILDING PROFILES	O&M PROCEDURES	MAINT. SCHEDULES ELEC/MECH EQUIP.	PREPARE, MONITOR, INTERPRET ELEC/ MECH. SYSTEM LOGS	'LOOK,LISTEN,TOUCH' PROCEDURES	ENERGY AUDITS	IDENTIFYING OPPORTUNITIES ELEC/MECH. SYSTEMS	PLAN,BUDGET,SCHED. O&M MEASURES	VALUE,ANALYZE, PREPARE,PRESENT CAPITAL PROPOSALS FOR RETROFITS	OBTAINING OUTSIDE SERVICES	TRACKING & MAINT. ENERGY SAVINGS	RECRUITING	MOTIVATING	TRAINING AND UPGRADING	ASSESSING PERFORMANCE	ASSIGNING RESPONSIBILITIES AND WORKLOADS	
SOUTHERN ALBERTA INSTITUTE OF TECHNOLOGY (CALGARY, ALBERTA)																	
BUILDING SYSTEMS ADMINISTRATOR (DAY,NIGHT,CORRESP.)		X	X				X	X				X	X	X	X	X	
AUTOMATED BLDG. CONTROL SYSTEMS (NIGHT)																	
TARGET COMMUNICATIONS (TORONTO) (SEMINARS)																	
ENGINEERING INTERFACE AND CHALIFOUR, MARCOTTE (TORONTO AND MONTREAL) (SEMINARS)						X	A				X						
MEDICINE HAT COLLEGE 'ENERGY MANAGEMENT FOR HIGH ENERGY USE BLDGS.' (SEMINAR ON VIDEO TAPES)	X	X	X	X		X	X	X	X					X		X	

TABLE 4.1: MATCH OF EXISTING TRAINING TO NEEDS: PROPERTY MANAGER

Those entering the program receive training in the following areas:

* Building Preventative Maintenance

* Energy Management

* Personnel Supervision and Management

These areas were given considerable mention in the property manager's list of identified 'needs to know' (see Appendix 2 for detailed content-SAIT). However, the program will not be available until 1986.

An individual with extensive training in the above areas would be an ideal individual to provide these services to a property management firm.

This program will be available through 'night' courses and correspondence from S.A.I.T. and other community colleges and agents as designated by S.A.I.T. in Canada.

The other courses offered for property managers are too specific and not relevant in the context of 'Building Operation, Maintenance and Energy Management' areas. One deals with 'Automated Building Control Systems'; advising owners and managers on how to assess the need for centralized computer control.

4.2.2.2 Building Operators

A number of courses are offered, both by correspondence and 'night' course, intended to upgrade existing operators/superintendents in building operation and maintenance. This is particularly relevant to those with no background in the area. The content covers Boilers, Water Treatment, Heating Systems and Water Heating. It is not known to what extent 'Look, Listen, Touch' or 'Annual Suite Inspections' are covered. These were seen as essential in what this position needs to know. This training might be more suited to upgrading operators to a technical support level.

BUILDING OPERATOR 'NEEDS TO KNOW' / DELIVERY AGENT 'TRAINING AVAILABLE'	BUILDING OPERATION AND MAINTENANCE								COMMENTS
	IDENTIFY AND REPORT UNUSUAL CONDITIONS IN ELEC/MECH.SYSTEMS	'LOOK, LISTEN, TOUCH' INSPECTIONS	O&M LOGS ON MECH/ ELEC. SYSTEMS	CHECK & MAINTAIN SETTINGS ON CONTROLS/TIMECLOCKS	ANNUAL IN SUITE INSPECTION	CLEAN, MAINTAIN, LUBRICATE ELEC/MECH SYSTEMS	RECORD ENERGY/WATER METER READINGS	CHANGE FILTERS, BELTS	
SOUTHERN ALBERTA INSTITUTE OF TECHNOLOGY									
BASIC BUILDING OPERATION (CORRESP.)	X			X		X		X	EXPOSURE TO ELEC/MECH. SYSTEMS (O&M)
BUILDING OPERATOR A (NIGHT)									SUITED MORE TO UPGRADE TO TECHNICAL SUPPORT
BUILDING OPERATOR B (NIGHT)									PREREQUISITE FOR BUILDING OPERATOR A
BUILDING SYSTEMS TECHNICIAN (CORRESP.) (NIGHT)									COURSE CONTENT MORE SUITED TO COMMERCIAL/INSTITUTIONAL BUILDINGS
HEATING TECHNICIAN									

TABLE 4.2: MATCH OF EXISTING TRAINING TO NEEDS : BUILDING OPERATOR

4.2.2.2 Building Operators (Continued)

The only correspondence course of relevance to the needs of building operators is that offered by the Southern Alberta Institute of Technology. No prerequisites are required and the material appears to cover the basics of mechanical systems in schools, apartment and office buildings.

The 'Basic Building Operation' course is available Canada-wide at a cost of $40 for a duration of 12 months and should be useful to building superintendents who have no background in this area.

The other courses appear to be at an advanced level and therefore not entirely suited to the needs of apartment building operators/superintendents unless, of course, as stated earlier, they wish to upgrade themselves to the technical support level.

4.2.2.3 Technical Support Staff

A number of programs are currently available across Canada which cover the identified needs of those in the Technical Support category.

Full-time programs in Energy Management and/or Energy Systems technology are offered at Humber College, Southern Alberta Institute of Technology, Holland, Mohawk and Malaspina colleges.

These courses tend to cover energy management topics, but frequently overlook building operation and maintenance areas and cover very little relating to supervision.

Many of the programs have heavy emphasis on industrial processes and commercial building systems; not necessarily relevant to the needs of technical support staff in the apartment sector.

TECHNICAL SUPPORT STAFF 'NEEDS TO KNOW' / DELIVERY AGENT 'TRAINING AVAILABLE'	BLDG. OPERATION & MAINTENANCE			ENERGY MANAGEMENT							SUPERVISION		COMMENTS
	BUILDING PROFILES	O&M GUIDELINES AND PROCEDURES	O&M CHECKLISTS AND LOGS	COST/BENEFIT ENERGY MEASURES	PLAN, SCHEDULE, UNDERTAKE O&M MEASURES	PREPARE O&M AND CAPITAL BUDGET PROPOSALS FOR ENERGY MEASURES	TECHNICAL SPECIFICIATION PREPARATION FOR TENDERS	EVALUATE TENDERS AND/OR PROPOSALS	'TRACKING' AND 'MAINTAINING' ENERGY SAVINGS	ENERGY MANAGEMENT PROGRAM REPORTS FOR STAFF AND UPPER MANAGEMENT	DEFINE ROLES/ RESPONSIBILITIES/ ACTIONS FOR STAFF	UPGRADE STAFF ON 'NEW' SYSTEM O&M REQUIREMENTS	
HOLLAND COLLEGE (CHARLOTTETOWN, P.E.I.) ENERGY SYSTEMS TECHNOLOGY (DAY)				X	X	X	X		X	X			INDUSTRIAL, COMMERCIAL EMPHASIS
MOHAWK COLLEGE (HAMILTON, ONTARIO) ENERGY SYSTEMS TECHNOLOGY (DAY)													COMBINATION OF ELEC/MECHANICAL TECHNOLOGY
HUMBER COLLEGE (TORONTO) ENERGY MANAGEMENT TECHNOLOGIST (DAY)				X				X		X			THIRD YEAR OPTION FOLLOWING A C & REFRIG. TECHNICIAN COURSE
MALASPINA COLLEGE (NANAIMO, B.C.) ENERGY TECHNOLOGY (DAY)													NOT ENERGY MANAGEMENT ORIENTED
SOUTHERN ALBERTA INST. OF TECHNOLOGY (CALGARY, ALBERTA)													
ENERGY MANAGEMENT TECHNOLOGY (DAY)				X	X				X	X			PREREQUISITE - 2 YEAR TECHNOLOGY
BUILDING SYSTEMS ADMINISTRATOR (DAY,NIGHT, CORRESPOND.)		X		X	X						X		BUILDING SYSTEMS TECHNICIAN COURSE IS A PREREQUISITE
AUTOMATED BLDG. CONTROL SYSTEMS (NIGHT)													COMPUTER CONTROLLED ENERGY MANAGEMENT (TOO SPECIFIC)
TARGET COMMUNICATIONS (TORONTO) (SEMINARS)													WILL TAILOR SEMINARS TO NEEDS
ENGINEERING INTERFACE & CHALIFOUR, MARCOTTE (SEMINARS)					X				X				LITTLE INFORMATION PROVIDED
MEDICINE HAT COLLEGE 'ENERGY MANAGEMENT FOR HIGH ENERGY USE BLDGS.' (SEMINAR ON VIDEO TAPES)	X	X			X	X		X	X	X	X		APPEARS TO ADRESS THE 'NEEDS' IN MOST AREAS. MAY BE COMMERCIAL ORIENTED

TABLE 4.3: MATCH OF EXISTING TRAINING TO NEEDS: TECHNICAL SUPPORT PERSON

Of the programs reviewed, that which appeared to cover the needs of this function was the 'Building Systems Administrator' course at Southern Alberta Institute of Technology. This course, which was already mentioned under the 'Property Manager' section, will be available on a full-time, night course or correspondence basis early in 1986.

The three main courses (beyond the Building Systems Technician program prerequisite) cover: Building Preventative Maintenance; Energy Management in Buildings and Supervision. Building Preventative Maintenance and Supervision are covered by the programs mentioned previously and were identified as essential 'need to know' for the technical support person.

A seminar (on video tape) produced by Medicine Hat College, entitled "Energy Management for High Energy Use Buildings' appears to cover a number of relevant topic areas in the domain of the technical support person (see Appendix 2). It appears, however, from reviewing the promotional material, that the content is mainly commercial buildings oriented.

4.3 Alternatives to Existing Training Programs

Following the review of existing training and educational programs, it became evident that when one attempted to match existing courses and seminars to the needs of each of the functions, a number of gaps remained. This is clear on a close inspection of Tables 4.1, 4.2, and 4.3 in the previous section.

The project team then set about to identify possible alternatives to the current programs. They were intended to not only fill the content gaps noted earlier, but to meet the needs of both the owner and staff members with regard to nature, availability, timing and cost. The alternative training approaches identified were as follows:

1. Groups of owners pooling resources to hire consultant(s) to instruct on establishing preventative maintenance and/or energy management programs.

   This would use the 'workshop' approach to covering items listed under the 'needs to know' for both property managers and/or technical support staff.

2. A seminar/workshop program including an energy audit followed by a detailed description of operation and maintenance; energy conservation opportunities and actions.

   A format similar to that of the Ministry of Housing - Engineering Interface workshops would be employed.

   Target Audience: Property Managers and Technical Support Staff.

3. Audio Visual package(s) detailing areas suitable for energy conservation opportunities in apartment buildings with an energy management consultant available to provide further details and answer specific questions.

   This A.V. package would identify opportunities and develop strategies in both operation and maintenance and retrofit categories.

   Target Audience: Property Managers and Technical Support Staff.

4. Audio Visual Package(s) detailing the concept of "Look, Listen and Touch" inspections; in-suite inspections; logging functions (electrical & mechanical systems); meter reading (all utilities); identification and reporting procedure of 'unusual' conditions in electrical/mechanical systems.

This package(s) would be specifically tailored to the identified needs of the building superintendent/operator in the apartment sector.

Target Audience: Building Operator Superintendent.

5. Audio Visual Package(s) describing preparation of a "Building Profile"; setting up a planned service and preventative maintenance program; how to prepare for, review and assess the report, resulting from an energy audit; how to value analyze capital expenditures for implementation of energy measures; how to assign duties and responsibilities during installation and commissioning of retrofit energy measures.

The above topics would be covered in a series of A.V. packages. Formal programs currently do not cover these areas.

Target Audience(s): Property Managers and/or Technical Support Staff.

No attempt has been made in the current task to develop the detailed content or assess the cost of production/distribution/presentation of the above alternative training approaches. However, the subject areas addressed have been identified as being either inadequately covered or omitted by 'existing' programs available across Canada.

Operation and Maintenance

* Responsibilities/actions for property managers are highly technical. They are not technically qualified but it would be good if their skills could be upgraded. Our company is in process of taking some control functions out of the hands of the super by installing remote control and monitoring equipment.

* Our property managers perform most functions outlined. If they could not perform them because of workload, workload would be reduced to accommodate the energy management functions which are very important to us. If these functions are not performed by my staff, then they will not have a job. Our company is installing remote control and monitoring equipment in our larger buildings to improve efficiency by reducing "human error".

* Add to matrix: logging function, detailing date of installation of new equipment, name of contractor, cost, servicing requirements and qualify the need for installation.

* What about air conditioning equipment and maintenance procedures?

* Superintendents do not have the technical skills required to perform some of the outlined functions.

* Superintendents cannot be expected to repair weatherstripping. Most aluminum doors and windows have special weatherstripping which requires technical expertise.

Energy Management Program Function

* It would be good to have property managers involved with energy management, but they are too busy with other responsibilities to get involved.

* Responsibilities/actions present ideal situation. There is no way it could work in our company - we don't have an energy management program and company is not interested in one.

* Our organization is set-up in a similar format.

* Our organization is set-up in a similar format, but not so clearly defined.

* Add to matrix something relating to establishing a checklist of key equipment that requires servicing on a regular basis.

* Superintendents have too much work to do, burdening them with energy management responsibilities would not work.

* Responsibilities/actions outlined present ideal situation. It is not always attainable in apartment management.

* Responsibilities/actions outlined describe "Utopia", not practical in our company though, we're too busy to be set up that way.

5.2 Awareness of Existing Training Programs

The interviewees were asked whether they were aware of any of the training and/or educational programs available across Canada. They were provided with a copy of the summary of programs (see Appendix 2).

Five of those interviewed were aware of some of the programs cited; although none had taken any of the courses. Two participants knew of associates who had taken one or more of the programs but they could not comment on the appropriateness and/or usefulness of the courses.

One property manager commented that superintendents were too busy to attend courses even if they were aware of them.

Eight of the interviewees cited the Workshop program conducted by Engineering Interface and sponsored by the Ontario Ministry of Municipal Affairs and Housing (not included in summary of programs) as being extremely useful at the time. This was the only other program which the participants could identify.

5.3 Owner/Manager Response to Alternative Training Programs Approaches

The alternative training programs/approaches proposed by E.I.L., Mel Shear, and ORF were presented to the owner/manager for their comment.

1. Groups of owners pooling resources to hire consultant(s) to instruct on establishing preventative maintenance and/or energy management programs.

The responses to this approach are summarized below:

* A forum made up of property owners/managers exchanging ideas would be preferred. Technical support would be required to qualify any suggested ideas.

* Not a practical idea - apartment owners & managers don't get together too often. It might work if the price was very low.

* It is unlikely that owners would cooperate in pooling resources

* Good idea - the more property owners/managers know about energy management, the better

* It wouldn't work in Toronto, but might work in smaller towns and cities where owners cooperate far more than they do here!

* It's doubtful whether our company would subscribe to this type of program

* No need, we use a consultant to advise on energy management

* Owners of smaller groups of buildings might go for this.

2. A seminar/workshop program including an energy audit followed by a detailed description of operation and maintenance; energy conservation opportunities and actions.

* Night sessions would be preferred for owners of smaller groups.

* Property owners/managers that do not already have an energy management program in place may not "feel the need" for such presentations, only those interested or "converted" would attend.

* Good idea - A 6 session course would be preferred, maximum cost $500/session. A similar format to Engineering Interface Ltd. workshop program would be ideal.

* Good idea - but time constraints of property owners/managers may keep them away.

3. Audio Visual package(s) detailing areas suitable for energy conservation opportunities in apartment buildings with an energy management consultant available to provide further details and answer specific questions.

* Good idea, if kept simple. Make video available for purchase.

* No practical benefit, impersonal, presentation is less effective in getting message across.

* Not good material for audio/visual presentations - needs to be "hands-on".

* Slide presentation preferred to allow stop-start for dialogue and clarification of points made.

4. Audio Visual Package(s) detailing the concept of "Look, Listen and Touch" inspections; in-suite inspections; logging functions (electrical & mechanical systems); meter reading (all utilities); identification and reporting procedure of 'unusual' conditions in electrical/mechanical systems.

* Especially good for new superintendents.

* Good idea providing supers can all get together at the same time, may be difficult to arrange.

* Supers may not be capable of understanding concepts. It could encourage unnecessary tampering with equipment - "A little knowledge can be a dangerous thing in the wrong hands".

* Video preferred - supers cannot get time off. Sell copies of video to property management companies.

* Good idea, but it must be kept simple for supers to understand.

* Too high an expectation for supers to understand this. An A/V presentation may not be enough to enable them to perform the functions detailed.

5. Audio Visual Package(s) describing preparation of a "Building Profile"; setting up a planned service and preventative maintenance program; how to prepare for, review and assess the report, resulting from an energy audit; how to value analyze capital expenditures for implementation of energy measures; how to assign duties and responsibilities during installation and commissioning of retrofit energy measures.

* Not a bad idea, although property managers should know most of this.

* Poor idea, too much unrelated content.

* Excellent idea.

* Good idea if course is kept simple, without too many technicalities. Most property managers should know this material already.

* Good idea - try Teledon for visual aids & animation.

* More than one session will be required for all this material.

* Property managers in our company have no time or inclination for this type of presentation.

5.4 Owner/Manager Recommendations for Future Training

The participants were then asked to provide their own recommendations for future skills upgrading/ training. This solicited the following comments and suggestions:

* Simplified reference manuals would be an asset for each of the key players, i.e. owner/ manager, technical staff and building superintendent. Periodic energy management workshops similar to Engineering Interface's program would be a great help; "hands-on" approach very important.

* Educational background of operating personnel too varied. It would be difficult to tailor a program to maintain the interest of the whole group.

* Encourage energy management students to take a work term(s) in property management. Transfer of knowledge would be beneficial both ways.

* Establish an energy management night course for condominium supers at community colleges. A 3 month course, 1 night per week would be ideal.

Five of the participants stated that the alternatives mentioned previously covered most of their preferences for skill upgrading programs.

5.5 Owner/Manager Responses to Other Related Issues

All of the participants indicated that they had energy management programs in place. Two comments, however, left some doubt in one's mind as to their committment:

* But only in buildings not owned by our company (i.e. managed but not owned).

* Enthusiasm that was present at start of program has waned. Many recommendations are not adopted because of the lack of enthusiasm (E.I.L. indicate that this company has no 'tracking' or 'monitoring' program in place which provides the needed motivation).

When asked whether they felt a better definition of roles in energy management and operation and maintenance (as detailed in Tables 2.3 and 2.4) would lead to saving more money; seven responded positively. Comments were as follows:

Better 'Energy Management' Role Definition

* Increased awareness of property managers in energy management area can only help to save money.

* Restructuring our job descriptions may adversely affect morale.

Better 'Operation and Maintenance' Role Definition

* A planned maintenance program costs more money, both energy cost and O&M costs increase.

* Planned maintenance of key equipment will save money.

* Planned maintenance increases building system efficiency; reduces incidence of breakdown.

As to whether they had planned/preventative maintenance programs in place, seven of the participants answered 'yes', with the following comments:

* Cost of setting up program is too expensive.

* Only projects that can afford a maintenance program have one.

Finally, the owners/managers were asked whether rent review was a major issue when considering an energy management/preventative maintenance program. As expected, rent review was seen as a major obstacle by five of the interviewees; some of the comments follow:

* There is no incentive to save money while rent review board uses utility costs in their assessment.

* Energy management/preventative maintenance programs are shelved if building is in the process of applying for rent review.

* Rent review is a big disincentive, you cut your own throat if energy savings are made whilst applying for rent review.

* Rent Review Board penalizes owners/property managers for saving money. It encourages the owner/manager to spend more in order to get a good review ruling.

The remaining individuals manage condominiums or public housing where rent review is <u>not</u> an issue.

6.1 Definition of Staff Roles

The energy related functions of property managers, operators and technical staff developed by the project team establish more or less an ideal framework in which energy use can be minimized in the high-rise residential sector.

The resulting framework, for day-to-day operations and maintenance and energy management activities, was reviewed with property managers who unanimously agreed that it was in fact the 'ideal' situation.

Property managers argued that they were simply too busy with other responsibilities; functional framework described would simply not work in their respective companies. Many admitted that energy management responsibilities were not part of their job function.

There appears to be a 'catch-22' situation here in that all agreed that the operational framework described was ideal but for some reason(s) unworkable.

It would appear that apartment management is by crisis, generally. Time management is an obvious problem. No one takes the time to establish plans, staff goals; workloads; delegate responsibility; keep records etc. to enable the day-to-day operations to run more smoothly. Once managed by objectives, these firms could devote more time to energy management activities.

6.2 What Staff Members Need to Know

Once the 'ideal' functional framework was established, it became clear what each member of the owner's staff needed to know to effectively perform their function. They are summarized in Table 6.2 again for convenience.

TABLE 6.2 : WHAT STAFF MEMBERS NEED TO KNOW

Property Manager

Building Operation and Maintenance

* prepare building profiles, operating and planned maintenance manuals for electrical, mechanical systems
* prepare maintenance schedules and workloads
* prepare, monitor and interpret mechanical/electrical system logs
* prepare annual site inspection instructions/ checklist
* prepare guidelines for 'look, listen, touch' inspections of electrical, mechanical and structural systems
* prepare logs, monitor and interpret recordings of energy and water consumption

Energy Management in Buildings

* identify opportunities to reduce energy used by electrical/mechanical systems
* review, assess and understand the recommendations of an energy audit
* evaluate, plan, budget and schedule the implementation of operation and maintenance measures identified by the energy audit
* value and analyse capital expenditures for retrofit/replacement energy measures
* prepare and present capital retrofit proposals to the owner
* identify and secure outside services
* call and review tenders; let contracts; assign duties and responsibilities for installation and commissioning of retrofits/replacement energy measures
* 'track' and maintain energy savings following retrofit

Supervision

* recruit, hire, motivate, train, upgrade, assess performance of building(s) staff to ensure the success of an energy management program.

Technical Support Staff

Building Operation and Maintenance

* develop and update building profiles
* develop guidelines; checklists or logs; operation and maintenance procedures for building electrical, mechanical and structural systems

Energy Management in Buildings

* evaluate cost/benefit of energy conservation measures (both O&M and retrofit/replacement)
* prepare both O&M and capital budget submissions for energy measures
* develop technical specifications for tenders of energy measures
* evaluate tenders and recommend actions to the property manager
* plan, schedule and undertake (where appropriate) O&M and retrofit energy measures
* develop and implement an energy use accounting or 'tracking' method for an energy management program
* prepare energy management program reports of progress, problems and achievements for upper management

Supervision

* define roles/ responsibilities/actions for staff during implementation of energy measures on an on-going basis
* upgrade operating staff on 'new' system operation and maintenance requirements

Building Operator/Superintendent

Building Operation and Maintenance

* Carry out 'look, listen, touch' inspections of electrical, mechanical and structural systems
* Identify and report unusual conditions in electrical/mechanical system operation
* Complete operational logs of electrical/ mechanical systems operation
* Check and maintain control and timelock settings on electrical/mechanical systems
* Carry out annual in suite inspections
* Check, clean, maintain, lubricate electrical/ mechanical systems
* Record energy and water meter readings
* Change filters and drive belts

6.3 Match of Existing Training Programs to the Needs

Within the apartment sectors' constraints with respect to availability, cost, nature (correspondence preferred) and timing, only a few programs in community colleges and institutes appeared to address the needs of property managers, technical support staff and building operators.

* 'Building Systems Administrator' - Southern Alberta Institute of Technology

Course material covers a number of the identified 'needs to know' for both property managers and technical support staff.

* 'Basic Building Operation' - Southern Alberta Institute of Technology

Course material provides operator with 'exposure' to electrical/mechanical systems operation and maintenance.

However, a number of programs (some co-operative) at community colleges, are turning out graduates in either Energy Management or Energy Systems technology. These programs do cover much of the needs of the Technical Support category and could provide property management firms with needed energy management capabilities.

The owner/managers interviewed were unaware of the program cited above.

6.4 Alternative Approaches to Training

The majority of the owner/managers rejected the concept of owners pooling resources to hire consultants to instruct on establishing preventative maintenance and/or energy management programs. The main reason cited was that owners and managers, in major centres, were not likely to co-operate in such a program.

The concept of a seminar/workshop program including an energy audit followed by identification of energy conservation opportunities would obtain more support judging from the results of the interview process. A format similar to the Engineering Interface/Ministry of Housing workshop series was preferred by those interviewed.

The audio-visual package(s) proposed for the building operator detailing 'Look, Listen and Touch' Inspections; logging functions; meter reading; identifying and reporting unusual conditions was well received by those owner/managers interviewed.

The last of the alternatives developed by the project team which gained the support of many of the owner/managers involved a series of A.V. packages describing:

* Preparation of a Building Profile
* Establishing a Preventative Maintenance Program
* Preparing for; Reviewing and Assessing the Recommendations of an Energy Audit
* Value Analyzing capital expenditures for Implementation of energy measures
* Assigning Duties and Responsibilities during Installation and Commissioning of Retrofit Energy Measures.

Printed reference material would be required to accompany the audio-visual presentations.

Definition of Staff Roles

The functions of property managers, operators and technical staff were developed primarily to identify what each member of the owner's team needed to know to effectively undertake energy related activities. Responses from the owner/managers interviewed leaves one with the sense that this operational framework (although supported unanimously) is rarely employed in the apartment sector.

This leads one to conclude that energy conservation through better operations and maintenance and identification of further energy measures cannot be achieved without first establishing an effective functional framework in the apartment building sector.

The work initiated here to develop an effective function/action matrix for the apartment sector needs to be expanded with input on a larger scale from owner/managers who have similar structures (and appear to be reducing operation and maintenance costs as a result). Only then will management by 'crisis' be replaced by management by 'objectives'.

This recommendation is supported by the fact that seven of the owner/managers felt that better definitions of roles in energy management and operations and maintenance would lead to saving more money (and energy).

Match of Existing Training Programs to the Needs

Those programs which appear to meet the identified 'needs to know' of property managers, technical support staff and building operators in the apartment sector (both offered by correspondence through S.A.I.T.) need to be more closely examined. The material obtained for this review identify the subject areas but do not address course content.

Further contacts with the Southern Alberta Institute of Technology are required to more accurately assess the relevance of these programs. Where these courses currently have gaps in content, a joint undertaking to develop new material could possibly be undertaken by BETT and S.A.I.T.

Graduates from full-time courses in energy management or energy systems technology at community colleges across Canada should be encouraged to seek employment with property management firms.

Property management firms should consider hiring co-operative students from these programs to work with them in their portfolios. The students have an opportunity to acquire practical experience in multi-unit residential buildings; while the property management firms have a relatively low cost opportunity to assess the benefits of having these skills in their organization.

Alternative Approaches to Training

Of the five 'alternatives' developed in this task, those which would receive the most support in the multi-unit residential sector (based on owner/manager input) are:

Property Manager/Technical Support Staff

A seminar/workshop similar in concept to the Engineering Interface/Ministry of Housing series.

A series of audio-visual packages covering:

* Preparation of a Building Profile
* Establishing a Preventative Maintenance Program
* Preparing for, reviewing and assessing the recommendations of an Energy Audit
* Value analyzing capital expenditures for implementation of energy measures
* Assigning duties and responsibilities during installation and commissioning of Retrofit Energy Measures.

Building Operator

An audio-visual package(s) detailing:

* 'Look, listen and touch' inspections
* Logging functions
* Meter readings
* Identifying and reporting unusual conditions in electrical/mechanical systems
* Annual in suite inspections.

The initial undertaking would be to develop manuals or workbooks to accompany the presentations. These could be developed by the BETT program.

The A.V. packages would require considerable production funds which might be obtained through a Government of Canada Ministry with the responsibility for training (the production could be co-ordinated through BETT).

The A.V. packages (together with workbooks) could be distributed on a cost-recovery basis to consultants and/or property management firms across Canada (as recommended by more than one owner/manager).

Consultants in the various regions of Canada could be 'instructed' and designated by BETT as support persons to assist with presentation and interpretation of the material. This latter cost would be borne by the owner/property management company.

The subject of cost is a very sensitive issue based on the input received from the owner/managers. The concept outlined above could reduce their costs to an attractive level (which appears to be in the range of $500 per session) and hence ensure large participation.

APPENDIX 1

STAFF RESPONSIBILITIES

Appendix 1: Staff Responsibilities

The 'Charters of Accountability' for owner/manager; technical support staff and building operators encompassing their full scope of responsibilities are presented in this appendix.

This information is included to provide the reader with a clear understanding of the entire scope of responsibilities for these functions.

The 'Charters of Accountability' were developed by Mel A. Shear. Mr. Shear, for a period of 17 years, was Vice-President Maintenance Services with Cadillac Fairview Corporation Limited. The functional accountabilities presented here were implemented at Cadillac Fairview.

OWNER/PROPERTY MANAGER CHARTER

A) PURPOSE OF THE CHARTER

1. To define the Development, Marketing, Leasing, Administrative and Maintenance Services accountabilities of the Owner/ Property Manager.

2. To set objectives and standards against which performance can be measured.

B) PURPOSE OF THE OWNER/PROPERTY MANAGER

1. To successfully develop, design, build or buy, manage or operate a building or buildings, by maximizing profits for a privately owned building and reducing subsidies for buildings that are owned publicly.

2. To assure that the comfort, safety and ambience of the occupants is better than they can obtain elsewhere.

3. To protect the owner's reputation for quality and integrity and the investment in the property.

4. To achieve agreed upon goals using a minimum of time, dollars, tools, equipment, ideas, people and space.

5. To achieve pre-determined objectives through other people by co-ordinating manpower, machinery, time and materials. To get the right things done by delegating, motivating, communicating, evaluating and improving themselves and others.

C) OBJECTIVES OF THE OWNER/PROPERTY MANAGER

1. To identify the people needed on real estate management teams, their goals and objectives and their functional accountabilities.

2. To satisfy the emotional needs of the people on those teams and those of the occupants of the buildings being managed.

OWNER/PROPERTY MANAGER CHARTER

C) OBJECTIVES - continued

3. To provide, today and tomorrow, all the qualified people needed to develop, design, build, manage and operate buildings.

4. To assure the safety, security and comfort for the occupants of the buildings being managed and the members of the management team.

5. To maximize profits for the privately owned buildings and reduce subsidies for publicly owned buildings.

D) MANAGEMENT INTENT

The owner delegates to the property manager a large measure of initiative and self-direction. A manager is expected to manage a property as carefully as he/she would if it were his/her own business. He/she is expected to control expenditures as if it were all money out of his/her own pocket.

An owner/property manager should be as critical of any flaw in courtesy, friendliness and service, in a building, as he/she would be if he/she were a tenant paying the highest rent.

To accomplish this, the owner/property manager, must be qualified to carefully apportion his/her time between improving his/her tenant relations, overseeing all of the applicable support services illustrated on the management support services chart attached to this charter, and by personally inspecting the buildings. He/she must resist giving too much time to any one of these functions -- usually the one in which he/she is most experienced and interested.

OWNER/PROPERTY MANAGER CHARTER

D) MANAGEMENT INTENT - continued

The owner/property manager should place the greatest emphasis on those functions in which he/she is least experienced. With the assistance of people with the specialized skills shown on the support services chart, and through other industry recognized educational institutions, owners/property managers should be continually expanding their skills -- human, conceptual and technical that they will need to become the most competent owner/property manager.

E) SCOPE OF ACCOUNTABILITY

To adequately manage the services needed to develop, design, build or buy, manage or operate a building, owners or their property managers would need to be knowledgeable about all the services illustrated on the building management support services charts and detailed as functional accountabilities and forming a part of this charter.

F) MANAGEMENT FUNCTIONAL ACCOUNTABILITIES

1. Develop a management organizational team that suits the business of the owner.

2. Define the functional accountabilities for the middle and first line managers identified by that organizational hierarchy.

3. Recruit, hire, motivate, train, develop, assess performance and upgrade people to professionally and adequately fill the roles identified by that organizational hierarchy.

4. Develop policies and standards and assure that they are achieved.

OWNER/PROPERTY MANAGER CHARTER

F) MANAGEMENT FUNCTIONAL ACCOUNTABILITIES - continued

5. When required, set up suitable management and/or field offices.

6. Establish short and long term planning goals.

7. Develop a system of preparing income and expense budgets for each building in the management portfolio.

8. Analyze the results of the management program and feedback information and suggestions to the owner on a regular basis.

G) FINANCE AND ADMINISTRATIVE FUNCTIONAL ACCOUNTABILITIES

1. Assure that there is an administrative and finance system that adequately supports and value analyzes the feasibility of new ventures, acquisitions, renovations or retrofits.

2. Assure that there is an admininstrative system that controls revenue received from leasing and other sources, as well as the expenditures for renovations, retrofits, staff salaries, repair and maintenance, fuel, water, electricity, taxes, insurance, legal fees and other management expenses.

3. Assure that there is adequate legal, tax, insurance, personnel, marketing, leasing and other operational services for the portfolio being managed.

4. Provide bridge, mortgage and other financing when required.

5. Provide financial audits and other management controls through an adequate information system.

OWNER/PROPERTY MANAGER CHARTER

H) DEVELOPMENT FUNCTIONAL ACCOUNTABILITIES

1. Assure that there is adequate design, specifications, project management, construction management and maintenance support services to value analyze the acquisition of an existing property, to complete a renovation or retrofit, or to build a new building.

2. Identify the major components for a building, establish and maintain a current price list for them so as to monitor the initial and on-going cost for these components over their life span.

3. Acquire land or new properties to satisfy the future needs and the goals of the enterprise.

4. Liase with maintenance support services about built-in problems and be aware of the costs to correct them.

5. Develop pro-forma and budget projections for the department and for any new projects.

6. Seek municipal approvals for projects, when required.

7. Assume responsibility for a building until the building is occupied.

8. Participate with maintenance support services during formal turnover of a new property and assist them in preparing a building profile.

9. Provide as-built and microfilm of the structure, landscaping and electrical/mechanical systems for all properties being managed or being added to the portfolic.

10. Keep everyone on the management team informed about plans for developments, acquisitions, renovations or retrofits at management meetings or by written reports.

OWNER/PROPERTY MANAGER CHARTER

I) MAINTENANCE SERVICES FUNCTIONAL ACCOUNTABILITIES

1. Develop maintenance services standards and specifications for the buildings being managed and assure that they are being maintained.

2. Define the in-house and outside maintenance support services required to manage the portfolio. Publish and keep up-to-date a suppliers and services guide showing the specifications, the services and the people recommended, what they do and how much they charge.

3. Develop operations budget projections that include a planned maintenance and energy management program, costs for custodial care, non-routine repairs, on-site staff costs, capitalized expenditures for renovations and retrofits, the consumption goals and the projected costs for fuel, water, and electricity.

4. Provide the statistical data required for short and long term maintenance management planning.

5. Develop, implement and monitor a planned maintenance and energy management program.

6. Define, specify, document, obtain quotations and complete all major renovations and/or retrofits.

7. Liase with the owner when considering the purchase or development of a new project.

8. Formally take-over all new buildings that are added to the management portfolio.

9. Develop a building profile and energy audit for all buildings being managed.

OWNER/PROPERTY MANAGER CHARTER

I) MAINTENANCE SERVICES FUNCTIONAL ACCOUNTABILITIES - continued

10. Keep up-to-date, all as-built plans and microfilm files for them.

11. Prepare at least one annual written report for each building being managed that would include an inspection of the structure, the housekeeping, groundskeeping conditions, as well as an inspection of the electrical/mechanical systems.

12. Define the on-site and maintenance support services required for each building being managed, set job specifications for in-house staff. Recruit, hire, train, motivate, assess performance and up-grade them. Develop specifications for all maintenance functions, renovations or retrofits, tools, equipment, supplies, parts and materials required for each building in the portfolio.

13. Keep the owner and the members of the management team informed about maintenance and operations activities, either at managment meetings, or by regularly submitting written reports.

J) LEASING AND ADMINISTRATIVE FUNCTIONAL ACCOUNTABILITIES

1. Define and provide leasing and administrative services that ensure safety, comfort and ambience for the people living or working in the buildings being managed.

2. Manage all leasing functions. Set rent rolls, document all move-ins and move-outs, manage any rent subsidies or other special programs for the tenants.

3. Formulate policies in relation to elegibility criteria.

4. Liase verbally and in writing with administration, development and maintenance support services concerning plans for all new projects. Feedback problems along with recommendation for correcting them for all existing and new buildings.

OWNER/PROPERTY MANAGER CHARTER

J) LEASING AND ADMINISTRATIVE FUNCTIONAL ACCOUNTABILITIES -cont'd

5. Recruit, hire, train, motivate, assess performance and upgrade people that provide leasing and other management services for the tenants.

6. Develop an operational budget for the department.

7. Develop and maintain the necessary administrative recordkeeping control.

8. Develop and maintain an up-to-date client profile of all applicants on a waiting list, and a directory of all the present tenants. Maintain vacancy records and availability records.

9. Prepare a revenue budget for each building being managed and maintain statistical data for long and short term planning.

10. Maintain a high level of public relations. Never argue with a tenant.

11. Co-operate and participate with any government ministry, other institution or agency that is involved with developing, designing, building, managing, operating or servicing the real estate industry.

BUILDING OPERATOR'S CHARTER

A) PURPOSE OF THE CHARTER

1. To define the Leasing, Administrative and Maintenance Services accountabilities of the Building Operator.

2. To set objectives and standards against which performance can be measured.

B) PURPOSE OF THE BUILDING OPERATOR

1. To operate and maintain the assigned building and its electrical/mechanical equipment to the standards established by the owner.

2. To direct and supervise any other on-site staff performing duties in the assigned building.

C) OBJECTIVES OF THE BUILDING OPERATOR

1. To help provide safety, security and comfort for the tenants in the assigned building.

2. To always maintain the assigned building to the owner's standards.

3. To expand their skills, especially those in which they are least experienced, so that they will become a more competent Building Operator.

4. To provide professional and prompt service to tenants that report problems.

5. To assist in protecting the owner's investment in the building by carrying out regularly scheduled inspections, routine maintenance, custodial care and non-routine repairs in a professional manner.

BUILDING OPERATOR'S CHARTER

D) SCOPE OF ACCOUNTABILITY

1. To adequately perform services required by tenants of apartment buildings, Building Operators would need to know how to perform the functions listed as Leasing and Administrative Services and attached to this charter.

2. To adequately operate the building's electrical/mechanical equipment and maintain the interior and exterior of the building in accordance with the Maintenance Services tasks detailed and attached to this charter.

3. To adequately provide for the safety and security of the tenants.

E) FUNCTIONAL PERFORMANCE TASKS

LEASING AND ADMINISTRATIVE SERVICES

1. Obtain and maintain current and future rental vacancy information and keep up-to-date, availability signs, including sublets, in accordance with the information received from the owner or manager.

2. Have on hand a current price list for the suites in the building.

3. Maintain a harmonious, but formal, relationship with the tenants in the building.

4. Be aware of existing policies, the lease, and the rules and regulations; such things as: - rental policies - electricity or heat included in rental fee - adult or family building - adult floors only - assisted rental policies, etc.

5. Be aware of rental features and be prepared to show available apartments. Such things as: size of suites - amenities - location of schools, churches, shopping, bus stops, etc.

6. Complete applications to rent and accept deposits from prospective tenants.

BUILDING OPERATOR'S CHARTER

LEASING AND ADMINISTRATIVE SERVICES - continued

7. Maintain key, parking and locker control in accordance with the policies set by the owner.

8. Collect rents and post-dated cheques from the tenants, give receipts for cash and ensure safe delivery of all funds to the owner or to people authorized to receive them.

9. Control move-in and move-out of tenants, prepare accurate incoming and outgoing inspection reports within the guidelines set by the owner.

10. Maintain files of all maintenance requests, work and purchase orders until the work is completed. Follow up on incomplete orders and keep files up-to-date by sending all completed orders to the owner or the manager.

11. Report to the owner or the manager, any unusual activities in the building, including an illegal removal.

MAINTENANCE SERVICES

1. Carry out, within the guidelines set by the owner and attached to this charter, daily, weekly, and scheduled inspections and maintenance on all the electrical/mechanical equipment installed in the building. Monitor the efficiency of the equipment by recording the readings on heating and cooling systems logs.

2. Carry out daily, weekly and scheduled housekeeping and groundskeeping duties within the schedules set out by the owner and attached to this charter.

3. Hire and train all building staff that may be required to assist you with your workload. Prepare time cards and schedules of duties for all on-site staff.

4. Clean and maintain vacant suites in a rentable condition or to the standards set by the owner.

BUILDING OPERATOR'S CHARTER

MAINTENANCE SERVICES - continued

5. Know how to use, care for and maintain all the equipment, tools, supplies and materials assigned to your building. Maintain inventory lists and order replenishments as directed by the owner or the manager.

6. Document all tenant maintenance requests, follow up and correct them, where possible, if not, arrange to have them corrected by sending the maintenance request to the owner or to the manager.

7. Supervise all work done by support service trades by observation and by recording on your copy of the purchase order their in and out times and the materials they used.

8. Make reports in writing, especially of any deficiencies in the building that you may observe or are brought to your attention.

SECURITY, SAFETY AND FIRE PROTECTION SERVICES

1. Respond to all emergencies, such as fire, flood, no heat, power failure and other such problems that could be considered an emergency.

2. Be aware of all valves and controls and their purpose so that they can be properly activated in event of an emergency.

3. Maintain, close to the phone, a list of all emergency numbers and who to call for additional support.

4. Always post a notice of your whereabouts on the door of your office or apartment whenever they are vacant or locked.

5. During the winter season, the walks should be inspected on a regular basis so that any hazardous condition can be corrected as soon as possible.

BUILDING OPERATOR'S CHARTER

SECURITY, SAFETY AND FIRE PROTECTION SERVICES - continued

6. Understand and know how to test the fire control systems.

7. Be qualified to use fire extinguishers.

8. Inspect the fire safety equipment, maintain information in the log books, as required by the local fire codes.

9. Carry out a fire drill when requested.

10. Practice first aid when necessary.

F) ACCEPTANCE

The conditions and performance tasks detailed in this charter are mutually accepted by the undersigned.

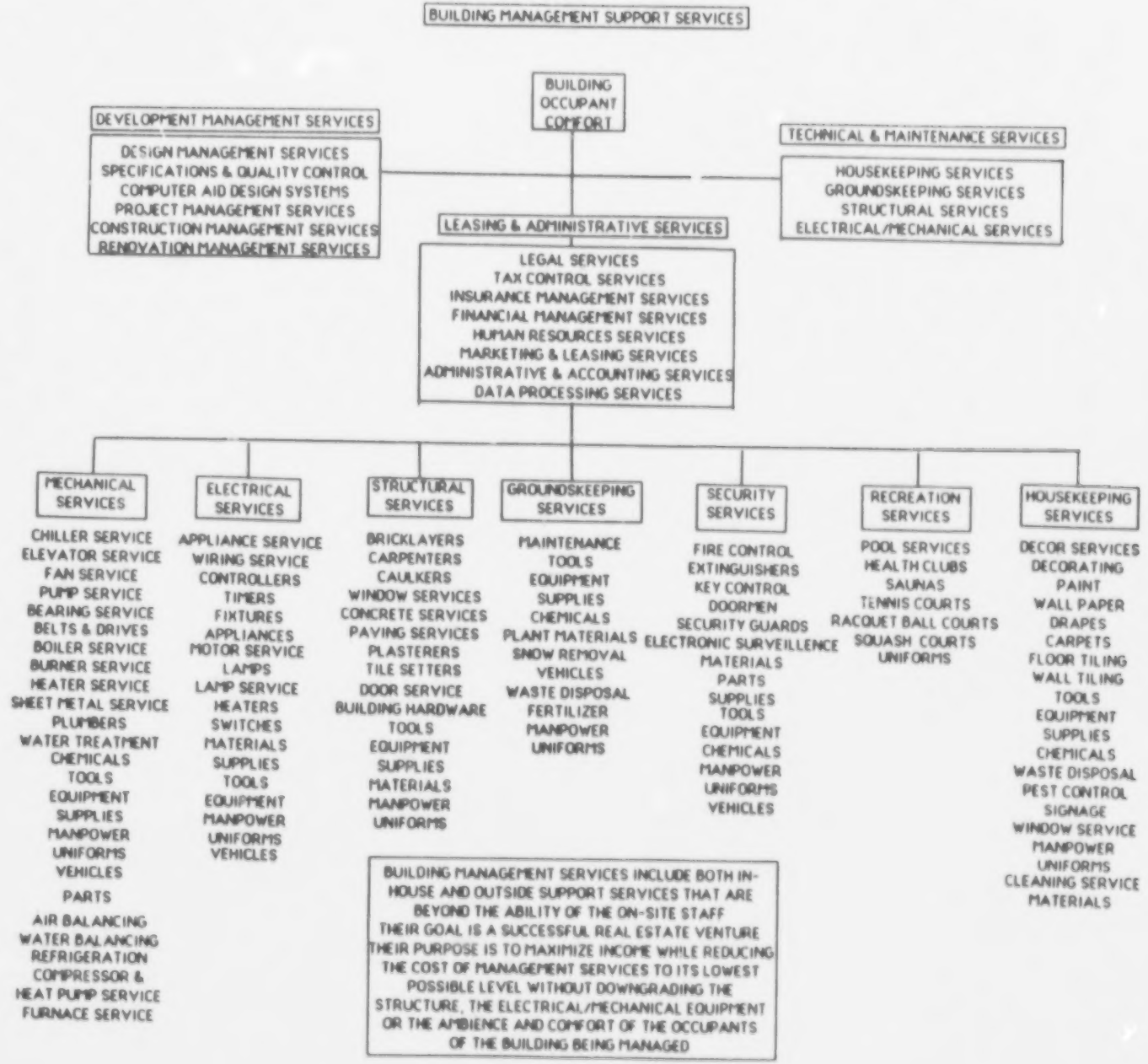
Dated at_____ this ____ day of _____ 19__

Building Operator_____ Operator's Wife_____

Building Name_____

Building Address_____

Building Owner or Manager_____


BUILDING MANAGEMENT SUPPORT SERVICES
BUILDING OCCUPANT COMFORT
DEVELOPMENT MANAGEMENT SERVICES
DESIGN MANAGEMENT SERVICES
SPECIFICATIONS & QUALITY CONTROL
COMPUTER AID DESIGN SYSTEMS
PROJECT MANAGEMENT SERVICES
CONSTRUCTION MANAGEMENT SERVICES
RENOVATION MANAGEMENT SERVICES
TECHNICAL & MAINTENANCE SERVICES
HOUSEKEEPING SERVICES
GROUNDSKEEPING SERVICES
STRUCTURAL SERVICES
ELECTRICAL/MECHANICAL SERVICES
LEASING & ADMINISTRATIVE SERVICES
LEGAL SERVICES
TAX CONTROL SERVICES
INSURANCE MANAGEMENT SERVICES
FINANCIAL MANAGEMENT SERVICES
HUMAN RESOURCES SERVICES
MARKETING & LEASING SERVICES
ADMINISTRATIVE & ACCOUNTING SERVICES
DATA PROCESSING SERVICES
MECHANICAL SERVICES
CHILLER SERVICE
ELEVATOR SERVICE
FAN SERVICE
PUMP SERVICE
BEARING SERVICE
BELTS & DRIVES
BOILER SERVICE
BURNER SERVICE
HEATER SERVICE
SHEET METAL SERVICE
PLUMBERS
WATER TREATMENT
CHEMICALS
TOOLS
EQUIPMENT
SUPPLIES
MANPOWER
UNIFORMS
VEHICLES
PARTS
AIR BALANCING
WATER BALANCING
REFRIGERATION
COMPRESSOR &
HEAT PUMP SERVICE
FURNACE SERVICE
ELECTRICAL SERVICES
APPLIANCE SERVICE
WIRING SERVICE
CONTROLLERS
TIMERS
FIXTURES
APPLIANCES
MOTOR SERVICE
LAMPS
LAMP SERVICE
HEATERS
SWITCHES
MATERIALS
SUPPLIES
TOOLS
EQUIPMENT
MANPOWER
UNIFORMS
VEHICLES
STRUCTURAL SERVICES
BRICKLAYERS
CARPENTERS
CAULKERS
WINDOW SERVICES
CONCRETE SERVICES
PAVING SERVICES
PLASTERERS
TILE SETTERS
DOOR SERVICE
BUILDING HARDWARE
TOOLS
EQUIPMENT
SUPPLIES
MATERIALS
MANPOWER
UNIFORMS
GROUNDSKEEPING SERVICES
MAINTENANCE
TOOLS
EQUIPMENT
SUPPLIES
CHEMICALS
PLANT MATERIALS
SNOW REMOVAL
VEHICLES
WASTE DISPOSAL
FERTILIZER
MANPOWER
UNIFORMS
SECURITY SERVICES
FIRE CONTROL
EXTINGUISHERS
KEY CONTROL
DOORMEN
SECURITY GUARDS
ELECTRONIC SURVEILLENCE
MATERIALS
PARTS
SUPPLIES
TOOLS
EQUIPMENT
CHEMICALS
MANPOWER
UNIFORMS
VEHICLES
RECREATION SERVICES
POOL SERVICES
HEALTH CLUBS
SAUNAS
TENNIS COURTS
RACQUET BALL COURTS
SQUASH COURTS
UNIFORMS
HOUSEKEEPING SERVICES
DECOR SERVICES
DECORATING
PAINT
WALL PAPER
DRAPES
CARPETS
FLOOR TILING
WALL TILING
TOOLS
EQUIPMENT
SUPPLIES
CHEMICALS
WASTE DISPOSAL
PEST CONTROL
SIGNAGE
WINDOW SERVICE
MANPOWER
UNIFORMS
CLEANING SERVICE
MATERIALS
BUILDING MANAGEMENT SERVICES INCLUDE BOTH IN-HOUSE AND OUTSIDE SUPPORT SERVICES THAT ARE BEYOND THE ABILITY OF THE ON-SITE STAFF
THEIR GOAL IS A SUCCESSFUL REAL ESTATE VENTURE
THEIR PURPOSE IS TO MAXIMIZE INCOME WHILE REDUCING THE COST OF MANAGEMENT SERVICES TO ITS LOWEST POSSIBLE LEVEL WITHOUT DOWNGRADING THE STRUCTURE, THE ELECTRICAL/MECHANICAL EQUIPMENT OR THE AMBIENCE AND COMFORT OF THE OCCUPANTS OF THE BUILDING BEING MANAGED

TECHNICAL SUPPORT CHARTER

A) PURPOSE OF THE CHARTER

1. To define the technical support services accountabilities.

2. To set objectives and standards against which performance can be measured.

B) PURPOSE OF TECHNICAL SUPPORT SERVICES

1. To provide housekeeping, groundskeeping, structural or electrical/mechanical support services to owners or managers of buildings.

2. To help owners, managers and operators to develop maintenance and energy management standards and specifications.

3. To help owners, managers and operators prepare their annual budget projections. These would include planned maintenance, energy management program goals, renovations and retrofits.

4. To assist owners and managers by providing consulting services when they are considering the purchase or development of a new project or the need for problem assessment and recommendations for solving them.

5. To assist the owner or manager when they take over a new building.

6. To assist the owner or manager to develop building profiles and energy audits for the buildings being managed by them.

7. To provide, at least on an annual basis, hands-on written inspections of buildings for owners or managers, or when requested by them.

8. To assist the owner or manager to define on-site and the technical support services they require for each building they manage.

TECHNICAL SUPPORT CHARTER

B) PURPOSE OF TECHNICAL SUPPORT SERVICES - Continued

9. To assist the owner or manager to upgrade their on-site staff.

10. To provide emergency services to their customers.

11. To help owners or managers to provide safety, security, comfort and ambience for the occupants of their buildings.

C) OBJECTIVES OF TECHNICAL SUPPORT SERVICES

1. To identify the people needed for their particular area of services expertise, their goals, objectives and their functional accountabilities.

2. To research and work very closely with building owners and managers to assure that they are developing and providing the right kind of support services for the buildings being managed.

3. To keep up-to-date on the latest products, materials, services, tools, equipment, parts and service contracts and recommend them to their customers.

4. To help their staff and the staff of their customers to develop and pursue excellence by providing services of high quality, timliness, reasonable cost and through smooth and efficient work scheduling.

5. To contribute to the improvment of the real estate industry by working very closely and actively with people who develop, design, build, manage and operate buildings.

6. To grow profitably and at the same time help building owners and managers protect their investment in the buildings being managed.

TECHNICAL SUPPORT CHARTER

D) SCOPE OF ACCOUNTABILITY

Technical Support Services technicians are needed by people who develop, design, build, manage or operate buildings. Their expertise could be in either housekeeping, groundskeeping, structural or electrical/mechanical services (see attached chart).

Skilled technicians in all of these specialized areas are needed to support owners and managers who need to make important decisions that are beyond the ability of themselves or their on-site staff to make.

Owners with small portfolios or individual buildings would need to be able to purchase the right kind of support from people who may design, build or provide services to existing buildings. To help their customers do the right thing right and to monitor what they are doing, it would be necessary to keep records of their activities and make them available to their customers and to the industry in general.

People in the business of providing technical support services should co-operate with all the real estate management institutions, local, provincial and federal government ministries to assure that they support, participate and contribute to the improvement of the industry.

E) MANAGEMENT FUNCTIONAL ACCOUNTABILITIES

1. Develop a support service organizational hierarchy that suits the business of the owner.

2. Define the functional accountabilities of the people on that team.

3. Recruit, hire, motivate, train, develop, assess performance, and upgrade people to fill the roles identified on the support services team.

TECHNICAL SUPPORT CHARTER

E) MANAGEMENT FUNCTIONAL ACCOUNTABILITIES - continued

4. Develop policies and standards and assure that they are achieved.

5. Establish short and long term goals.

6. Analyze the support services needs for your customers and provide them.

F) FINANCE AND ADMINISTRATIVE FUNCTIONAL ACCOUNTABILITIES

1. Assure that there is an administrative and finance system that adequately supports the type of services provided to the customers.

2. Assure that all services are value analyzed so that the needs of the customers and the business are constantly being assessed and satisfied.

3. Assure that there is adequate legal, insurance, personnel, marketing and accounting support for the business and an information feedback system that would be useful for the customers.

4. Prepare annual budget projections and monitor the actual results.

G) MAINTENANCE AND ENERGY MANAGEMENT FUNCTIONAL ACCOUNTABILITIES

1. Develop maintenance support services standards that are required by people who develop, design, build, manage and operate buildings.

2. Define, not only the support services, but also the on-site services that need to be performed in buildings, on a daily basis.

TECHNICAL SUPPORT CHARTER

G) MAINTENANCE AND ENERGY MANAGEMENT FUNCTIONAL ACCOUNTABILITIES - Continued

3. Be aware of, and work with the customers, to help them develop budget projections for their buildings.

4. Provide for the customers, statistical data that they may require for long and short term maintenance and energy management planning.

5. Develop, implement and monitor a planned maintenance and energy management program for their customers. Complete success will only be achieved when there are no further opportunities to save them money.

6. Define, specify, document and quote on major renovations, energy measure retrofits, building or equipment replacements as required by the customers.

7. Provide written inspections and hands-on instructions for owners, managers and operators.

8. Liase with owners or managers when they are considering the purchase or intend to develop a new project.

9. Help them formally take over a new building.

10. Develop building profiles and energy audits for all the buildings being serviced.

APPENDIX 2: CRITIQUED DIRECTORY OF EXISTING TRAINING (EDUCATION PROGRAMS)

Appendix 2: Critiqued Directory of Existing Training (Education Programs)

At the outset, through a variety of sources, a number of institutions and organizations were identified as offering energy related courses or seminars for the building operation and management industry. In some cases, no programs were offered or they were discontinued. These were:

- Construction Management Institute
- Saskatchewan Housing Corporation
- City of Fredericton, New Brunswick
- Prince Edward Island Forestry and Energy
- Ontario Condominium Association
- Property Managers Service Organization
- Metropolitan Toronto Apartment Builders Association
- Real Estate Institute of Canada

Three organizations have training programs, but they are not available to the public. These are:

- Ontario Ministry of Municipal Affairs and Housing
- Canada Mortgage and Housing Corporation
- Bell Canada

Of these, Bell Canada runs an Operational Training Facility in Toronto for in-house building operations staff. This provides hands-on and classroom training to their office building operators. Should a training facility for apartment building operators be established, the Bell Canada facilities might prove a valuable model.

The British Columbia Housing Management Commission is in the planning stage for implementing energy management seminars in 1985. No details are as yet available.

Two types of organizations offer training programs: colleges and consultants. Colleges offer three options, full time (day) technician and technologist diploma programs, continuing education (evening) programs and correspondence programs. Consultants offer seminars.

Tables 1 and 2 summmarize available courses and seminars with respect to title and the intended target audience. These tables are followed by an expanded description and critique of each course and seminar.

Table 1 - Courses

Title	Target Group	Type	Delivery Agent
Basic Building Operation	Operator/Technician	Correspond.	SAIT, Calgary
Building Operator A	Operator/Technician	Night	SAIT, Calgary
Building Operator B	Operator/Technician	Night	SAIT, Calgary
Building Systems Technician	Operator/Technician	Correspond. or night	SAIT, Calgary
Heating Technician	Operator/Technician	Day	George Brown College
Energy Systems Technology	Gen. Technologist	Day	Holland Coll. Charlottetown P.E.I.
Energy Systems Technology	Gen. Technologist	Day	Mohawk Coll. Hamilton
Energy Mgment.Eng. Technologist	Gen. Technologist	Day	Humber Coll. Toronto
Energy Technology	Gen. Technologist	Day	Malaspina Coll Nanaimo, B.C.
Energy Mgment. Technology	Gen. Technologist	Day	SAIT Calgary
Bldg. Systems Administrator	Technical Staff	Day Night or Corresp.	SAIT Calgary
Automated Bldg. Control Systems	Technical Staff/ Manager/Owner	Night	SAIT Calgary

Table 2 - Seminars

Title	Target Group	Delivery Agent
Commercial/Industrial Air Handling Systems	Engineers, Engineering Technologists	New Brunswick Energy Secretariat
Various Tailored Seminars	Property Managers	Target Communications Toronto
Six 3 day Seminars: Ventilation and Air Conditioning; Electrical Systems; Heating and Cooling; Envelope; Automated Building Systems; Energy Management Administration	Property Managers/ Technical Staff	Engineering Interface & Chalifour, Marcotte
Energy Management on High Energy Use Bldgs. (Seminar on Video Tape)	Property Managers, Technical Staff	Medicine Hat Coll. Alberta

PROGRAM/COURSE/WORKSHOP

SOUTHERN ALBERTA INSTITUTE OF TECHNOLOGY

Title:	Basic Building Operation
Geographic Area:	Canada-wide
Type (Course, Seminar):	Correspondence course
Target Groups:	Building Operators/Resident Managers
Delivery Agent:	College
Purpose:	Introductory course to the basic design, operation and maintenance of mechanical systems in small to moderate size schools, apartment and office buildings.
Content:	Fuels and combustion, steam heating, plumbing and water heaters
Length;	12 month duration (maximum)
Certificate; Diploma:	None Preparatory home study course for Building Operator 'B' Certificate (Alberta Boilers Act)
Principal Contact:	Mr. P. Williams
Cost:	$40.00
Critique:	This is a basic mechanical systems course and could be very useful to building superintendents who have no background in this area.

BASIC BUILDING OPERATION (Building Operator B)

Lecture	Subject
1	Basic Design of Low Pressure Heating Boilers
2	Boiler Fittings
3	Fuels and Combustion
4	Automatic Boiler Control
5	Water Treatment, Boiler Operation and Maintenance
6	Pumps
7	Piping, Fittings and Valves
8	Human Comfort, Steam Heating
9	Hot Water (Hydronic) Heating
10	Warm Air and Electrical Heating, Ventilation
11	Radiant Heaters, Humidifiers, Heating Controls
12	Electricity
13	Plumbing, Water Heaters
14	Building Safety
15	High Pressure Boilers and Fittings

Time Allowed: 12 months

Prerequisite:

No prerequisite is required for this course

Prepared For:

Building operators, custodians, resident-managers and others involv
mechanical equipment in buildings. Preparatory home study course for Bu
Operator B Certificate.

PROGRAM/COURSE/WORKSHOP

SOUTHERN ALBERTA INSTITUTE OF TECHNOLOGY

Title:	Building Operator 'A'
Geographic Area:	Calgary, Alberta
Type (Course, Seminar, Workshop):	Night school course
Target Groups:	Building Operators
Delivery Agent:	College
Purpose:	The individual will be able to maintain and operate mechanical and electrical systems efficiently.
Content:	Course 1 - Basic principles of design, operation and maintenance of mechanical and electrical equipment used in heating and ventilating systems. Course 2 - The course is intended to give the building operator a good understanding of the operation of air conditioning and refrigeration systems.
Length; Frequency:	Five hours per week per course, 14 week duration
Certificate; Diploma:	None
Principal Contact:	Mr. P. Williams
Cost:	Course 1 - $199.00 Course 2 - $167.00
Critique:	Preparatory course for the examination for the Building Operation 'A' Certificate (Alberta Boilers Act)

PROGRAM/COURSE/WORKSHOP

SOUTHERN ALBERTA INSTITUTE OF TECHNOLOGY

Title:	Building Operator B
Geographic Area:	Calgary, Alberta
Type (Course, Seminar):	Night-school Course
Target Groups:	Building Operators
Delivery Agent:	College
Purpose:	Introductory course to the basic design, operation and maintenance of mechanical and electrical equipment used for heating and ventilation.
Content:	Principles of design, operation and maintenance of mechanical and electrical equipment used for heating and ventilation.
Length; Frequency:	Two sessions of 3 hours per week for 14 weeks
Certificate; Diploma:	None Preparatory course to Building Operator B Certification examination (Alberta Boilers Act)
Principal Contact:	Mr. P. Williams
Cost:	$125.00
Critique:	Preparatory course for Building Operator B Certification examination (Alberta Boilers Act)

XPET-017 (DPE) **BUILDING OPERATOR B** **14 Weeks**

Prerequisite: None

Theory: Tuesday or Wednesday or Thursday
42 hours
7:00 - 10:00 p.m.
*Laboratory: 12 hours
7:00 - 10:00 p.m.

Fee: $125.00

This course introduces the basic principles of Code Requirements, design, operation and maintenance of mechanical and electrical equipment used for heating and ventilating small office buildings, schools, apartment buildings, etc.

It is intended for operators, resident managers and custodians who wish to prepare themselves for Building Operator B certificate examination under the Alberta Boilers Act.

Classroom instruction will cover; low pressure heating boilers, auxiliary equipment and controls, basic heating systems, electricity, plumbing and building safety.

*Laboratory instruction will include actual operation of boilers, pumps, water softeners, identification of fittings and controls, and study of cut-away models of equipment used for building heating. These hours will be on four evenings designated by the instructor.

In order to write the "Certification Examination" with the Alberta Boilers Branch, an individual must have six (6) months practical experience in the industry.

Upon successful completion of this course a student will be granted credit of three (3) months practical experience towards writing the examination.

NOTE: Students must have S.A.I.T.'s Basic Building Operation Correspondence Course (materials only), on the first night. Approximate cost $20.00.

Start/End date: Tues. Sept. 11 - Dec. 11/84
Wed. Sept. 12 - Dec. 12/84
Thurs. Sept. 13 - Dec. 13/84
Tues. Jan. 29 - April 30/85
Wed. Jan. 30 - May 1/85
Thurs. Jan. 31 - May 2/85

XPET-016 (DPE) **BUILDING OPERATOR A (HEATING)** **14 Weeks**

Prerequisite: *See below

Monday & Wednesday
or Tuesday & Thursday
7:00 - 9:30 p.m.

Fee: $199.00

This course is intended to give the building operator, resident-manager, or custodian a better understanding of the basic principles of design, operation and maintenance of mechanical and electrical equipment used in heating and ventilating systems of large modern schools, apartments and office buildings, and to assist him in the preparation for the examination for the Building Operator A Part A certificate under the Alberta Boilers Act.

Classroom instruction will cover: Elementary mechanics and thermodynamics; low pressure heating boilers, auxiliary equipment and controls; pumps, piping, water supply systems and water heaters; warm air, steam, hydronic, radiant, snow melting and electric heating systems; ventilation; heating controls; building safety; basic plumbing.

Practical demonstrations will be included where applicable.

***Building Operator B or equivalent experience. It is also recommended that students have Grade 10 Math and Physics or they could experience difficulties with the material covered.**

NOTE: Students must have S.A.I.T.'s H.A.C.B.O. Correspondence Course (materials only) for the first class. Approximate cost $35.00.

Start/End date: Mon. Sept. 10 - Dec. 19/84
Tues. Sept. 11 - Dec. 13/84
Mon. Jan. 28 - May 6/85
Tues. Jan. 29 - May 2/85

XEET-019 **BUILDING OPERATOR A (Refrigeration & Air Conditioning)** **10 Weeks**

Prerequisite: XPET-016 or equivalent

Monday & Wednesday
6:30 - 9:30 p.m.

Fee: $167.00

This course is a continuation of the XPET-016 course. It is intended to give the building operator a good understanding of the operation of air conditioning and refrigeration systems, and to assist him in the preparation for the refrigeration and air conditioning part of the examination for the Building Operator A certificate under the Alberta Boilers Act.

Classroom instruction will cover: Operation, and routine maintenance of reciprocating contrifugal absorption refrigerating equipment; air conditioning principles, equipment and controls. Laboratory demonstrations pertaining to this equipment and associated controls will be included where applicable.

Start/End date: Mon. Sept. 10 - Nov. 21/84
Mon. Jan. 28 - April 3/85

PROGRAM/COURSE/WORKSHOP

SOUTHERN ALBERTA INSTITUTE OF TECHNOLOGY

Title:	Building Systems Technician
Geographic Area:	Calgary (Canada-wide for correspondence course)
Type (Course, Seminar):	Correspondence Course or Night Course
Target Groups:	Building Operators/Technical Staff
Delivery Agent:	College
Purpose:	The individual will be able to maintain and operate mechanical and electrical systems efficiently.
Content:	Heating, refrigeration, electricity, air handling, automatic controls
Length; Frequency:	Evening Course: 2 courses per 14 week semester, 6 courses total. Correspondence course: 6 courses, 3 years maximum.
Certificate; Diploma:	Systems Maintenance Technician Certificate and qualified to apply for Operators 'A' Certificate Examination (Alta. Boiler Act).
Principal Contact:	Mr. P. Williams
Cost:	Correspondence: $300 Evening :N/A (possibly between $600 and $1000)
Critique:	This program provides all the basic information needed for efficient operation of electrical and mechanical systems in buildings. This program is sanctioned by BOMA.

Southern Alberta Institute of Technology
Calgary, Alberta

Power Engineering Department

BUILDING SYSTEM TECHNICIAN (BST)

The BST program consists of 6 courses covering the maintenance and operation of the basic mechanical, electrical and control systems used in modern commercial and institutional buildings.

This program was developed in co-operation with the Building Owners & Managers Institute International (BOMI) which is the educational institute operated by the Building Owners & Managers Association International (BOMA).

Students who complete the BST program as administered by SAIT and other educational institutions and who write a final exam in each course (set by BOMI and SAIT and administered by SAIT) will receive the international designation and certificate, Systems Maintenance Technician (SAIT), awarded by BOMI.

SAIT is BOMI's designated agent for administration of the SMT designation in Canada through use of the BST learning materials.

BST course materials will be available for purchase by all educational institutions in Canada for use in their own lecture courses. SAIT will also run a Canada-wide correspondence program for those students unable to attend courses at a nearby educational institute. The fees for each course are approximately $35.00 for text materials only, and approximately $15.00 more for assignment-grading in the correspondence program mode.

Students intending to study the BST program should hold a Grade 11 High School Certificate, including a credit in Grade 11 mathematics.

Southern Alberta Institute of Technology
Calgary, Alberta

Power Engineering Department

BUILDING SYSTEM TECHNICIAN PROGRAM

BST Course 1 - Introductory Topics

Lecture 1 - Basic Mathematics
2 - Elementary Mechanics
3 - Elementary Thermodynamics
4 - Life Safety
5 - Fire Protection and Prevention
6 - Pumps
7 - Lubrication and Bearings
8 - Air Compressors, Emergency Generators
9 - Piping and Valves
10 - Plumbing Systems

BST Course 2 - Heating

Lecture 1 - Basic Design of Low Pressure Heating Boilers
2 - Boiler Parts and Construction
3 - Boiler Fittings
4 - Combustion and Boiler Firing
5 - Automatic Boiler Controls I
6 - Automatic Boiler Controls II
7 - Boiler Water Treatment
8 - Boiler Operation and Maintenance
9 - Steam Heating
10 - Hydronic Heating
11 - Warm Air, Infrared and Electric Heating, Ventilation and Humidification for Small Buildings and Local Application.

BST Course 3 - Refrigeration

Lecture 1 - Principles of Refrigeration
2 - Refrigeration Equipment I
3 - Refrigeration Equipment II
4 - Refrigeration Controls and Accessories
5 - Operation and Maintenance of Compression Refrigeration Systems
6 - Absorption Refrigeration Systems

BST Course 4 - Electricity

Lecture 1 - Electricity: Basic Concepts
2 - Alternating Current Theory and Meters
3 - Motors, Generators and Transformers
4 - Electrical Equipment: General Concepts
5 - Source Systems and Circuits
6 - Conduction Systems
7 - Control, Grounding and Disconnection
8 - Electric Protection and Motor Circuits
9 - Lighting Fundamentals and Light Sources
10 - Luminaires and Lighting Design

BST Course 5 - Air Handling

Lecture 1 - Basic Principles of Air Conditioning
2 - Air Conditioning Equipment I - air flow, duct systems, grilles, dampers, louvres, noise
3 - Air Conditioning Equipment II - coils, humidifiers, filters, boxes
4 - Air Conditioning Systems
5 - Special Systems - total energy concept, thermal storage, heat recovery, heat pumps, solar heating, special exhaust systems, make-up air, computer and control rooms

BST Course 6 - Automatic Controls

Lecture 1 - Principles of Control
2 - Tubing
3 - Heating System Controls
4 - Air Conditioning Controls
5 - Centralized Control Systems

XPET-017 (DPE) **BUILDING OPERATOR B** **14 Weeks**

Prerequisite: None

Theory: Tuesday or Wednesday or Thursday
42 hours
7:00 - 10:00 p.m.
*Laboratory: 12 hours
7:00 - 10:00 p.m.

Fee: $125.00

This course introduces the basic principles of Code Requirements, design, operation and maintenance of mechanical and electrical equipment used for heating and ventilating small office buildings, schools, apartment buildings, etc.

It is intended for operators, resident managers and custodians who wish to prepare themselves for Building Operator B certificate examination under the Alberta Boilers Act.

Classroom instruction will cover; low pressure heating boilers, auxiliary equipment and controls, basic heating systems, electricity, plumbing and building safety.

*Laboratory instruction will include actual operation of boilers, pumps, water softeners, identification of fittings and controls, and study of cut-away models of equipment used for building heating. These hours will be on four evenings designated by the instructor.

In order to write the "Certification Examination" with the Alberta Boilers Branch, an individual must have six (6) months practical experience in the industry.

Upon successful completion of this course a student will be granted credit of three (3) months practical experience towards writing the examination.

NOTE: Students must have S.A.I.T.'s Basic Building Operation Correspondence Course (materials only), on the first night. Approximate cost $20.00.

Start/End date: Tues. Sept. 11 - Dec. 11/84
Wed. Sept. 12 - Dec. 12/84
Thurs. Sept. 13 - Dec. 13/84
Tues. Jan. 29 - April 30/85
Wed. Jan. 30 - May 1/85
Thurs. Jan. 31 - May 2/85

XPET-018 (DPE) **BASIC NATURAL GAS PROCESSING** **20 Weeks**

Prerequisite: None

Thursday
6:15 - 9:15 p.m.

Fee: $114.00

This is an introductory course designed to familiarize persons requiring a good general knowledge of gas processing. This course will stress the basic vessel and process functions of a modern sour gas processing facility.

Process overview, chemistry and physics of gas processing, safety, gas gathering and field dehydration, inlet separation, condensate stabilization, dehydration and refrigeration, LPG recovery and factionation, condensate recovery, product treatment and storage, sour gas treatment, sulphur recovery and tail gas clean-up, utilities, and instrumentation.

Class lectures will be supplemented by field trips when possible.

Textbook cost approximately $55.00

Start/End date: Thurs. Sept. 13 - Jan. 31/85

XPET-026 (DPE) **INTRODUCTION TO BUILDING SYSTEMS TECHNICIAN COURSE 1** **12 Weeks**

Prerequisite: *See below

Tuesday & Thursday
7:00 - 9:30 p.m.

Fee: $114.00

This course is designed to be an introduction into building system technician. This course introduces the student to applied sciences, safety, plumbing and auxiliary equipment.

*It is recommended that the student have Grade 11 as well as related work experience. (A Building Operator B Certificate would be an asset).

NOTE: Students must purchase section one of the BST course before the first class.

Start/End date: Tues. Sept. 11 - Nov. 29/84

XPET-027 **HEATING FOR BUILDING SYSTEMS TECHNICIANS COURSE II** **14 Weeks**

Prerequisite: XPET-026

Monday & Wednesday
7:00 - 9:30 p.m.

Fee: $199.00

This course is the second course in the Building System Technicians course. It will cover heating boilers, heating systems and accessories.

The student must purchase S.A.I.T. correspondence course in Building Systems Technician Section II before the first class.

Start/End date: Mon. Jan. 21 - April 29/85

XIIT-026 (DPE) **PROCESS MEASUREMENT I** **14 Weeks**

Prerequisite: Grade XI Physics and Math or equivalent (Journeyman's Certificate)

Monday
7:00 - 10:00 p.m.

Fee: $110.00

Covers physics related to process measurement including pressure, force, properties of matter, basic AC and DC fundamentals; SI units. Topics include measurement of volume, density, pressure, weight and level. Transmitter and recorder operation, installation and preventive maintenance procedures are emphasized. Theory will be supplemented by lab projects.

*NOTE: Due to the fact that there are only 13 Mondays during this period, one make-up night will be required.

Textbook cost approximately $35.00

Start/End date: Mon. Sept. 10 - Dec. 17/84

XIIT-027 (DPE) **PROCESS MEASUREMENT II** **18 Weeks**

Prerequisite: Process Measurement I or equivalent

Monday
7:00 - 10:00 p.m.

Fee: $125.00

Will include measurement of temperature flow. Temperature studies involve filled systems, thermocouples, resistance bulbs, potentiometer and Wheatstone bridge principles, indicators and recorders. Flow studies include measurement methods, fluid dynamics, Bernoulli's theorem, installation technique, metering and indicating devices, square root extraction, flow calculation. Theory will be supplemented by lab projects.

Textbook cost approximately $35.00

Start/End date: Mon. Jan. 28 - May 27/85

PROGRAM/COURSE/WORKSHOP

GEORGE BROWN COLLEGE

Title:	Heating Technician
Geographic Area:	Metropolitan Toronto
Type (Course, Seminar):	Full-time, 1 year program (3 consecutive semesters)
Target Groups:	Individual wishing training for the installation and service industry
Delivery Agent:	College
Purpose:	The individual will be able to install and service conventional heating systems.
Content:	Heating (commercial systems), central air conditioning and heat pumps, residential HVAC system design, oil burners, gas burners
Length; Frequency:	Three semesters, 18 weeks each
Certificate; Diploma:	Certificate
Principal Contact:	Mr. Bajin
Cost:	$15.20 per week
Critique:	Theory and practice have equal weight which gives the student a well-rounded knowledge in the design, servicing and installation of heating systems. Ideal (in principle) for service contractors or specialized technical staff duties.

HEATING TECHNICIAN

GBC Code AR542 **Starting:** September and January
Casa Loma Campus **Certification:** Certificate
3 Semesters

PREREQUISITE: Pre-entry test.

ABOUT THE PROGRAM: In the heating field, there is a considerable demand for technical personnel who are knowledgeable in oil, gas and electric heating and cooling systems. This demand has been created, in part, by the expansion of building construction.

Rising fuel prices and the need to conserve energy has created a growing concern in the consuming public as to the efficient operation of their heating systems. This sconcern has created a demand for skilled technicians knowledgeable in the servicing, installation, and design of the various types of residential and commercial heating and cooling systems.

The Heating Technician Program covers the application of all of the basic fuels (i.e. oil, gas, and propane) as well as electric heating and cooling systems. Heating system layout and design are covered in such areas as load calculations, system design and system balancing. New advances in residential and commerical heating technology such as heat pumps, high efficiency furnaces, and programmable environmental control have also been integrated into the program.

Both the theory and the practice of the above have equal weight which gives the student a well rounded knowledge in the design, servicing, and installation of heating systems.

CAREER PROSPECTS: Since the heating technician program covers many facets of heating and heating systems, graduates of the program will find diverse employment opportunities. Many are employed by gas companies, oil companies, and their prime contractors and dealers in sales, servicing and installation of heating systems. A large number of graduates will find employment with independent heating and cooling companies in design and layout as well as servicing and installation of heating and cooling systems. Large private and public corporations such as municipalities, school boards and property management companies will also employ graduates in the maintenance of their heating systems.

COURSES:

SEMESTER 1	18 WEEKS
HT502	Basic Electricity
HT501	Oil Burners
HT510	Heating (Residential Heat Load)
MATH538	Mathematics
ENG586	Language and Communication
ARDR531	Drafting and Blueprint Reading

SEMESTER 2	16 WEEKS
HT534	Propane
HT572	Residential HVAC System Design
HT540	Gas Burners (Fitter II)
PHY531	Physics
ENG587	Language and Communication

SEMESTER 3	18 WEEKS
HT573	Heating (Commercial Oil and Gas)
HT574	Heating (Commercial Systems)
MATH539	Mathematics
ENG588	Language and Communication
HT521	Central Air Conditioning and Heat Pumps

PROGRAM/COURSE/WORKSHOP

HOLLAND COLLEGE

Title:	Energy Systems Technology
Geographic Area:	Charlottetown, P.E.I.
Type (Course, Seminar):	Two-year full time course
Sponsor:	College
Target Groups:	Industrial and Commercial Building System Technologists
Delivery Agent:	College
Purpose:	The individual will be able to set up and implement energy management programs.
Content:	Energy Conservation (Commercial), Energy Management and Audits
Length; Frequency:	Two years of two semesters each
Certificate; Diploma:	Record of achievement
Principal Contact:	Terry Sarki (902) 566-4191 Fred McDonald
Cost:	$520 per year
Critique:	Subject areas address: set-up of energy management programs, energy audits and feasibility studies for energy conservation methods. Commercial and industrial sector applications are not necessarily pertinent to apartment buildings.

24

ENERGY SYSTEMS TECHNOLOGY

Objective:

This program prepares technologists for work in the field of conservation of Canada's energy resources and devises methods of reducing energy costs to industry and commerce.

Subject Areas:

The program is designed to assist students to:

- Develop Personal Competencies
- Carry Out Surveys of Plant & Processes to Identify Energy Conservation Opportunities
- Set Up & Maintain an Energy Awareness & Action Program for all Company Employees
- Prepare Feasibility Studies on Existing & Proposed Systems in Order to Establish Priorities in an Energy Management Program for Both Electrical & Mechanical Systems
- Evaluate Strategies to Determine Engineering Specifications & Evaluate Financial Implications
- Implement Approved Energy Management Projects
- Set Up & Maintain Systems for Monitoring Plants, Processes & Systems to Ensure Continuing Energy Efficiency

Skill Profiles:

- Energy Systems Technologist
- Energy Audit Technician
- Energy Systems Manager
- Building Systems Technician

Prerequisites:

Grade XII or equivalent

Duration:

Two years, including cooperative work study in industry

Possible Areas of Employment:

- Government Departments
- Manufacturing Industries
- Engineering Consultants
- Utilities Corporations

Location:

- Technology Centre
  West Royalty Industrial Park

PROGRAM/COURSE/WORKSHOP

HUMBER COLLEGE

Title:	Energy Management Engineering Technologist
Geographic Area:	Metropolitan Toronto
Type (Course, Seminar):	Full time college program. This is a third year option from Air Conditioning, Refrigeration Technician Course
Target Groups:	Persons wishing general energy management training leading to residential, commercial or industrial building technical support.
Delivery Agent:	College
Purpose:	The individual will be able to identify and perform energy conservation strategies.
Content:	Includes Energy Management Technology, Hydronic and Steam Systems, Lighting Systems, Energy Resources and Supplies
Length; Frequency:	One year. Fall, 1985 will be first offering of this course.
Certificate; Diploma:	Diploma
Principal Contact:	Mr. John Metcalfe
Cost:	$540.00 per year
Critique:	Prerequisite is two years in their Air Conditioning, Refrigeration and Engineering Technician program (or equivalent). This is general training for residential, commercial and industrial applications, including building operators and service company personnel.

520 Energy Management Engineering Technologist

North Campus

Six semesters beginning September

This program will provide its graduates with a broad and intensive knowledge of the design, operation and installation of energy systems for residential, commercial and industrial building complexes.

A graduate will be capable of applying engineering principles and conventions to achieve optimum energy conservation through a process of evaluation, monitoring, control, assessment and corrective action.

Admission Requirements

- Ontario Secondary School Graduation Diploma
- grade 12 English, grade 12 academic or technical mathematics, senior level physics and chemistry, or any combination of senior level science and technical subjects
- movement from semester 4 to 5 requires a 75% average in semester 4 (70% with permission).

Job Opportunities

A graduate of this program can expect a wide variety of employment opportunities in the residential, commercial and industrial sectors as well as in government departments at the federal, provincial and municipal levels. Graduates will be in demand by heating, ventilating and air conditioning equipment manufacturers, consulting engineers, architects, manufacturing industries, process industries, wholesalers, mechanical contractors and building owners (e.g. governments, school boards, hospitals, banks, chain stores and property management companies).

Curriculum
for first four semesters, see 519

Semester 5	(24 hours/week)	Credits
	Calculus 2	3
	Instrumentation 1	3
	Energy Management Technology 1	6
	Engineering & Econ. Analysis 2	3
	Hydronic & Steam Systems 2	3
	Heat Transfer	3
	Plumbing & Fire Protection Systems	3
Semester 6	**(26 hours/week)**	
	Energy Management Technology 2	6
	Instrumentation 2	3
	Process Systems	3
	Mechanical Estimating	4
	Contract Administration	3
	Lighting Systems	3
	Energy Resources & Supplies	2
	Energy Management Project & Report	3

PROGRAM/COURSE/WORKSHOP

MOHAWK COLLEGE

Title:	Energy Systems Technology
Geographic Area:	Hamilton, Ontario
Type (Course, Seminar):	Full time course, cooperative college program
Target Groups:	Person wishing career in energy management technology for large industrial or commercial firms (to institute and maintain energy conservation programs)
Delivery Agent:	College
Purpose:	The individual will be able to set-up and implement energy management programs
Content:	Lighting, energy audit, building environmental services, building and system maintenance
Length; Frequency:	Three years
Certificate; Diploma:	Technologist Diploma
Principal Contact:	Registrar's office 575-2000 Mohawk College Fennell Ave and West Fifth P.O. Box 2034 Hamilton, Ontario L8N 3T2
Cost:	$625 annual fee plus $200 experimental learning fee
Critique:	Included in the program are three additional semesters of field work experience. This energy technologists' program may be appropriate for individuals wishing to join a property management firm or consultant with specialized energy management openings.

PROGRAM/COURSE/WORKSHOP

MALASPINA COLLEGE

Title:	Energy Technology (Formerly Energy Systems Technology)
Geographic Area:	Nanaimo, B.C.
Type (Course, Seminar):	Two-year full time (day course), college
Target Groups:	Persons wishing general energy technology training
Delivery Agent:	College
Purpose:	The individual will be able to identify and perform energy conservation strategies.
Content:	Building Construction, Energy Auditing Procedures, Energy Systems Diagnosis, HVAC systems.
Length; Frequency:	Two years
Certificate; Diploma:	Associate in Technology Diploma
Principal Contact:	Mr. Jim Slater
Cost:	$275.00 per semester
Critique:	General 'hands-on' program. It has had problems with funding and/or attendance and will not be offered before 1985. The program provides general energy training for technologists rather than building energy operation and maintenance.

This three-year program has been designed to prepare technologists to work in energy management and contribute to the task of improving efficiency in the use of all forms of energy.

During the Eighties the cost of energy will continue to rise and shortages of conventional oil will begin to occur. Many sectors of industry will find that energy contributes significantly to the cost of their products and energy management will emerge as an important factor in cost reduction.

Graduates are involved in setting up energy conservation programs, in carrying out energy surveys in plants, commercial buildings and in institutions, with proposing, justifying and implementing cost-effective energy management projects and in ensuring that the operating efficiency is maintained.

Careers are available in all types of industry with companies spending one million dollars, or more, annually on energy. Opportunities also occur in the commercial sector, with consulting engineers, in federal, provincial and municipal government departments, with public utilities and with companies selling energy conservation equipment.

Energy Systems Engineering Technology is a three-year co-operative program. In addition to the six semesters of academic study, there are three paid experiential learning semesters with a company or government department anywhere in Canada.

These jobs provide the students with a total of twelve months of experience in the practice of energy management and are negotiated and co-ordinated by the college.

Through the co-operation of their employers, the students are able to integrate theory and practice and also earn academic credit for their learning objectives which are achieved on the job. This program includes a total of one year paid working experience.

F	W	S	F	W	S	F	W	S
1	2	3*	ES	4	ES	5	ES	6*

F—Fall
W—Winter
S—Summer
*—Two-month Semester
ES—Experiential (Co-op) Semester

The Program

The program of studies consists of both mechanical and electrical subjects so that the technologist can view the total energy picture with understanding and be capable of working in both areas. In addition, a variety of communications and computer subjects are included to reflect their importance in this field.

FIRST YEAR

SEMESTER 1
Engineering Science 1
Electricity 1
Mathematics
Chemistry
Engineering Drawing
Language Studies 1
Career Education
General Studies Elective

SEMESTER 2
Engineering Science 2
Electricity 2
Energy Audit 1
Mathematics
Computer Concepts
Chemistry
Language Studies 2

SECOND YEAR

SEMESTER 3*
Steam Systems 1
Electric Power and Machines 1
Utility Metering and Billing
Energy Audit 2
Schematics Interpretation
Instrumentation
Combustion and Feedwater Chemistry 1
Basic Programming
Report Writing
Practicum 1

SEMESTER 4
Steam Systems 2
Lighting
Manufacturing Processes 1
Building Environmental Services 1
Thermodynamics
Combustion and Feedwater Chemistry 2
Management Accounting
Mathematics (Calculus)

THIRD YEAR

SEMESTER 5
Building Environmental Services 2
Manufacturing Processes 2
Process Instrumentation
Advanced Programming
Statistics
Presentation Skills
Management of Human Resources
Heat Transfer
Electric Power and Machines 2

SEMESTER 6*
Occupational Health and Safety
Waste Management
Presentation Skills
Computer Controls
Management of Human Resources
Building and Systems Maintenance
Energy Resources and Supplies

*The third and sixth semesters are of two months duration.

This program has been designed to equip the graduate to trace, audit and monitor the energy utilization of a plant and to contribute to the company's energy management program.

Admission Requirements

Ontario Secondary School Graduation Diploma, or Ontario Secondary School Honour Graduation Diploma, plus the following program specific requirements:

Advanced Level English, Grades 11 and 12
Advanced Level Mathematics, Grades 11 and 12
Advanced Level Chemistry, Grade 12
Advanced Level Physics, Grade 11

Energy Technology

Introduction

During the 1970's the public became keenly aware that conventional fuel resources would not last forever. While interest in renewable energy continues to be widespread in Canada, most people now realize that good conservation measures together with well-operated conventional systems are also effective in reducing heating and cooling costs.

In response to requests for training and information on renewable resource utilization as well as conventional practices, Malaspina College established the Energy Systems Technology program in the fall of 1980. The name was shortened to the current one in the fall of 1983.

The Energy Technology program is designed to provide training in energy conservation practices, conventional and non-conventional energy sources, heating, ventilation, air conditioning and engineering procedures, automatic control procedures used on energy systems, marketing practices, and communication with others in the field and the general public. Students who successfully complete the two-year program will receive the A. Tech. Diploma.

Energy technologists are employed in a wide variety of firms and agencies: mechanical contractors, electrical contractors, general contractors, research and development groups, utilities, consulting engineering firms, architectural groups and inspection agencies, to name a few.

Admission Requirements

— In addition to the general admission criteria for technology students, Algebra 12, Chemistry 11 and Physics 11 are required. Physics 12 is a preferred subject.

— Prospective students having trades qualifications, especially in metal, electricity, electronics, instrumentation, HVAC or refrigeration may be given preference provided they have completed the formal secondary school prerequisites.

— Students who have completed science courses at the university level or equivalent will be eligible for equivalent credit in some courses. If there is any question about equivalency, the program coordinator should be contacted.

— In the summer between the first and second years of the program, all students are expected to obtain an energy-related job and so broaden their knowledge of the field.

Course Content

Course content for this program is continually under review. For additional information please contact the program coordinator.

FIRST YEAR

Fall Semester

	Credits	Contact Hours (Lec.:	Sem.:	Lab.)
Drafting 111T (General Technician Drafting I)	3	1.5	0	1.5
Electronics 161T (Electricity)	3	2	0	2
Energy 121T (Heat and Thermodynamics)	3	4	0	0
Energy 131T (Agricultural, Commercial and Industrial Applications and Future Technology)	3	3	0	0
Energy 151T (Sheet Metal I)	3	1	0	3
English 100 (English for Career Students I)	3	3	1	0
Mathematics 121T (Technical Mathematics)	3	4	1	0
Physics 131T (Energy Science I)	3	3	0	2
TOTAL	24		32 h	

Spring Semester

Computing Science 170T (Computer Applications for Technologists)	3	2	0	2
Electronics 162T (Electronic Controls)	3	2	0	2
Energy 125T (Fluid Mechanics)	3	3	0	0
Energy 132T (Solar Collectors and Energy Storage)	3	3	0	0
Energy 141T (Piping Design I)	3	1	0	3
English 101 (English for Career Students II)	3	3	1	0
Mathematics 122T (Calculus)	3	4	1	0
Physics 132T (Energy Science II)	3	3	0	2
TOTAL	24		32 h	

Special Session (Seven weeks)

	Credits	Contact Hours (Lec.:	Sem.:	Lab.)
Energy 122T (Heating, Ventilation and Air Conditioning)	2	4	0	2
Energy 133T (Solar Collector Construction and Testing)	2	0	0	6
Energy 142T (Piping Design II)	2	2	0	5
Energy 173T (Energy Practicum I)	2	0	0	5
Mathematics 123T (Statistics) (five weeks)	2	5	2	0
TOTAL	10		29 hr*	

*Since Mathematics 123T is a five week course, the number of contact hours in the Special Session is 31 for the first five weeks and 24 for the last two weeks; so the average is 29.

SECOND YEAR

Fall Semester

	Credits	Contact Hours (Lec.:	Sem.:	Lab.)
Administration 115T (Small Business Management I)	3	3	0	0
Drafting 112T (General Technical Drafting II)	3	1.5	0	1.5
Energy 211T (Active System Design and Retrofit)	3	3	0	2
Energy 251T (Sheet Metal II)	3	1	0	3
Energy 252T (Air Handling Systems)	3	2	0	2
Energy 261T (Basic Instrumentation)	3	3	0	2
Energy 281T (Energy Auditing Procedures)	3	3	0	0
Math 221T (Differential Equations and Applications)	3	4	0	0
TOTAL	24		31 h	

Spring Semester

Administration 231T (Organizational Behaviour)	3	1	2	0
Energy 212T (Energy Systems Diagnosis)	3	2	0	2
Energy 221T (Passive System Design and Retrofit)	3	3	0	0
Energy 231T (Refrigeration)	3	2	0	1
Energy 241T (Building Construction)	3	2	0	3
Energy 262T (Advanced Instrumentation and Control)	3	2	0	2
Energy 272T (Energy Practicum II)	3	0	0	5
Energy 282T (Cost and Optimization Engineering)	3	4	0	0
TOTAL	24		31 h	

Special Session II (Seven weeks)

Energy 213T (Solar System Installation)	2	1	0	4
Energy 273T (Energy Practicum III)	3	0	0	10
Energy 275T (Technical Report)	2	1	0	4
Surveying 150T (Surveying for Energy Technologists) (two weeks)	1	2	0	6
TOTAL	8		22.3 h	*

PROGRAM/COURSE/WORKSHOP

SOUTHERN ALBERTA INSTITUTE OF TECHNOLOGY

Title:	Energy Management Technology
Geographic Area:	Calgary
Type (Course, Seminar):	Full time, three semester, one-year course
Target Groups:	Individual wishing to become Energy Management Technologists
Delivery Agent:	College
Purpose:	The individual will be able to set-up and implement energy management programs.
Content:	Energy conservation, energy management techniques and systems, seminars by energy supply and user industries
Length; Frequency:	Three semesters of 12 weeks
Certificate; Diploma:	Energy Management Diploma
Principal Contact:	Mr. P. Williams
Cost:	$400.00
Critique:	Open to holders of a two-year diploma in a related technology. Instruction is in industrial and commercial applications; not all material will be pertinent to the apartment sector.

SOUTHERN ALBERTA INSTITUTE OF TECHNOLOGY
Calgary, Alberta

POWER ENGINEERING DEPARTMENT

Energy Management Technology

(Open to holders of a two year diploma in an applicable technology)

1. Credentials Awarded to Graduates

A SAIT Diploma in "Energy Management" is awarded to students who complete the course, pass set examinations, and successfully complete an energy related project (preferably in industry).

2. Purposes and Benifits of the Program

(a) To train technologists in energy management to meet a need that is now appearing in industry and commerce.

(b) To train students who will have knowledge of the new technologies which are now apparent in the energy field.

(c) To provide energy management personnel who can immediately contribute to reduced energy costs and reduced energy consumption.

(d) To provide personnel who can contribute to the training of future energy operators, technologists, and managers.

(e) To provide re-training of some existing technologists who wish to change their area of specialization.

3. Nature of Program and Summary Description of Curriculum

The Program covers four specific areas:

(a) Basic knowledge of the sciences and energy technology.

(b) Energy management and energy conservation.

(c) New technologies and alternative sources of energy.

(d) Lab work and project work.

Course duration is one academic year of three 12 week quarters. Total hours, approximately 1100.

First Quarter

		Class	Lab	Total
EMD191	Energy resources and energy use	60	0	60
EMD121	Thermodynamics applied to energy use	48	24	72
EMD181	Electrical theory applied to energy use	36	24	60
EMD182	Electronics applied to energy use	24	24	60
EMD161	Controls and instrumentation	36	24	60
EMD162	Microprocessors and computers	36	24	60
Total		240	120	360

Second Quarter

EMD292	Fuels and Combustion	36	12	48
EMD222	Boilers, furnaces, ancilliary equipment	36	12	48
EMD223	Heat transfer, heat transfer equipment	36	24	60
EMD262	Space heating, cooling, controls	36	12	48
EMD293	Energy conservation	36	24	60
EMD294	Energy management techniques and systems	36	0	36
EMD295	Seminars and case studies	60	0	60
Total		276	84	360

Third Quarter

			Projects, Audits	
EMD395	Energy audits and records	36	24	60
EMD371	Economics and financial aspects	24	24	48
EMD396	Rate structures and energy forecasts	24	0	24
EMD397	Reducing energy costs	24	12	36
EMD331	New technologies	36	0	36
EMD398	Alternative sources of energy	36	0	36
Total		180	60	240
Industrial Project			120	120

Lab Work and Projects

Lab Demonstrations

Operation and critical aspects of the following will be demonstrated:

Water and fire tube boilers
Gas and steam turbines
Compressors, internal combustion engines, and refrigeration
Electrical controls
Pumps, H.V.A.C. systems, heat pumps

Lab Work

The student will operate and carry out tests on:

Total energy system comprising gas turbine, electric generator, waste heat boiler, electric boiler, and chiller

Bomb calorimeter

Combustion unit including exhaust gas analysis

Boilers

H.V.A.C. system including simulations of different conditions

Electric motors to improve P.F.

Pumps

Lab Tests and Calculations

Thermography and insulation testing

Vibration analysis including energy aspects

Testing and comparison of fuels

Water treatment and effects of scaling

Combustion control using CO analyzer

Efficiency of photovoltaic systems

Computer and microprocessor control

Seminars by Supply and User Industries

Seminars are considered an important aspect of the course and it is intended that representatives of the supply and user industries present the seminars. Of particular interest are:

Electric and natural gas utilities
Oil and coal suppliers
Heavy oil and tar sands developers
Gas, chemical plant, and refinery operators
Nuclear industry
High rise office buildings
Hospitals and commercial buildings
Computer industry
Instrumentation suppliers
Boiler and furnace manufacturers
Airports and transportation

Energy Related Projects

In-term projects in various S.A.I.T. departments and in industry will be carried out to include:

Application of energy audit principles and methods

Keeping records

Audit calculations

Audit analysis

Audit reports, including conclusions and recommendations

Implementation and payback of recommendations

The final projects to be carried out in industry will be selected to investigate and report on areas of energy requirements which clients select, in conjunction with S.A.I.T. Emphasis varies with the topic area but may include:

Discussion of the "technology of the subject"

Experimental investigation

Comparisons with alternative approaches

Costing exercise to justify recommendations

Compilation of report

Module 9 - Heat Transfer and Heat Transfer Equipment

9.1 Thermal Insulation

Principles of thermal insulation

Thermal transmittance (μ values) of materials and structures

Applications of insulation to buildings and process plants

Energy saving aspects of insulation

Cost saving aspects of insulation

9.2 Thermography

Basic theory and applications, temperature measurement

Scanning of building envelopes

Preventative maintenance - buildings, electrical, piping systems, etc.

9.3 Heat Transfer Equipment and Heat Recovery

Principles of heat recovery

Liquid and gas coupled indirect heat exchangers

Plate and rotating regenerators

Waste heat boilers, economizers, recuperators

Heat pipes and heat pumps

Calculations and sizing of exchangers

Module 10 - Space Heating, Cooling, Controls

10.1 Space Heating

Assessment of thermal comfort

Effect of air temperature, globe temperature, % saturation and air velocity on comfort conditions

Comfort conditions

Heating systems and heat transfer, control of space heating

Economics of space heating systems

Concepts of degree days

Integrated environmental design

10.2 H.V.A.C. Systems

Types of H.V.A.C. systems

Calculation of air flows and temperature control for comfort and energy savings

Maintenance of H.V.A.C. systems

Enthalpy control

Effects and costs of inaccurate calibration of monitoring instruments

System modifications and retrofits

Waste heat recovery

10.3 Chillers and Refrigeration

Sizing and selection of units

Operation and control for energy efficiency

Use of synchronous motors

Maintenance

Waste heat recovery and free cooling systems

10.4 Building Design for Energy Efficiency

The building envelope

Building positioning, building materials, solar gains, and heat losses, etc.

Selection and positioning of optimum H.V.A.C. system and other equipment

Lighting systems and lighting efficiencies

System control strategy

PROGRAM/COURSE/WORKSHOP

SOUTHERN ALBERTA INSTITUTE OF TECHNOLOGY

Title:	Building Systems Administrator
Geographic Area:	Calgary, Alberta
Type (Course, Seminar):	3 courses of 11 lectures each
Target Groups:	Property managers, building owners
Delivery Agent:	College
Purpose:	The individual will be able to set-up and implement building maintenance and energy management programs.
Content:	Building preventive maintenance, energy management in buildings and personnel supervision and management
Length; Frequency:	N/Available
Certificate; Diploma:	Certificate, Systems Maintenance Administrator
Principal Contact:	Mr. P. Williams
Cost:	N/Available
Critique:	Course will not be available until 1986. It may be offerred as a day course, evening course or a correspondence course. Buildings Systems Technician Diploma is a prerequisite. An individual with this level of training, and the position 'Building Systems Administrator' within a property management firm, would be in an excellent position to undertake an on-going maintenance and energy conservation program for one or more buildings.

Southern Alberta Institute of Technology
Calgary, Alberta

Power Engineering Department

BUILDING SYSTEMS ADMINISTRATOR (BSA)

Students who complete the BST program and who wish to progress to positions of greater responsibility in the operation and maintenance of buildings, will be able to take three additional courses leading to the designation, Building Systems Administrator (BSA).

These three courses cover subjects pertaining to the building envelope, energy management and energy conservation, and personnel supervision and management.

These three additional courses are under development and should be available for general distribution in 1986.

Students who complete the BSA program as administered by SAIT and other educational institutions, and who write a final exam in each course (set by BOMI and SAIT and administered by SAIT) will receive the international designation and certificate, Systems Maintenance Administrator (SMA) awarded by BOMI.

Southern Alberta Institute of Technology
Calgary, Alberta

Power Engineering Department

BUILDING SYSTEM ADMINISTRATOR PROGRAM

Consists of the 6 courses in the Building System Technician Program, plus

BSA Course 7 - Building Preventive Maintenance

Lecture	1	Preventive Maintenance
	2	Computerized Preventive Maintenance
	3	Building Materials
	4	Exterior Walls
	5	Windows
	6	Doors
	7	Roofs
	8	Floors
	9	Ceilings
	10	Mechanical Equipment
	11	Electrical Equipment

BSA Course 8 - Energy Management in Buildings

Lecture	1	Procedure for Setting Up an Energy Management Program
	2	Energy Management - Building Envelope #1 (walls, roofs, doors, vestibules)
	3	Energy Management - Building Envelope #2 (windows, solar radiation, weatherstripping, caulking)
	4	Energy Management - Water Treatment Systems
	5	Energy Management - Heating Systems
	6	Energy Management - Plumbing Systems
	7	Energy Management - HVAC Systems
	8	Energy Management - HVAC Economizer, Heat Recovery
	9	Energy Management - Electrical
	10	Energy Management - Lighting
	11	Energy Management - Solar Systems
	12	Energy Management - Cogeneration Systems

BSA Course 9 - Supervision

Lecture	1	Fundamentals of Supervision
	2	Attitudes of Workers
	3	Motivation of Workers
	4	Leadership Styles
	5	Planning and Decision-Making
	6	Organizing Procedures
	7	Work Environment
	8	Supervising Union Employees
	9	Selection and Development of Employees
	10	Communications with Employees
	11	Evaluating and Counselling Employees
	12	Disciplining Employees

PROGRAM/COURSE/WORKSHOP

SOUTHERN ALBERTA INSTITUTE OF TECHNOLOGY

Title:	Automated Building Control Systems
Geographic Area:	Calgary, Alberta
Type (Course, Seminar):	Night-school Course
Target Groups:	Building operators, managers and owners
Delivery Agent:	College
Purpose:	Individual will be able to assess the need for centralized computer control
Content:	General overview of centralized computer control and monitor systems for fire protection, environmental control, security systems and energy management
Length; Frequency:	Three hours per week for 14 week duration
Certificate; Diploma:	None
Principal Contact:	Mr. P. Williams
Cost:	$110.00
Critique:	Introductory course to computer controlled energy management strategies.

XIIT-038 **AUTOMATED BUILDING CONTROL SYSTEMS** **14 Weeks**

Prerequisite: Experience in related field

Tuesday 6:30 - 9:30 p.m.

Fee: $110.00

Provides building operators, managers and owners with a general overview of centralized computer installations which control and monitor environmental, fire protection and securit systems in buildings.

Reviews the control and monitoring functions which computer installations can perform.

Identifies the energy management features which can only be implemented through centralized computer control.

Start/End date: Tues. Sept. 11 - Dec. 11/84

PROGRAM/COURSE/WORKSHOP

NEW BRUNSWICK ENERGY SECRETARIAT

Title:	Energy Options Conservation Seminars: Ventilation/Air Handling Systems, Industrial and Commercial.
Geographic Area:	Offered in Saint John, N.B. Preference given to New Brunswick residents
Type (Course, Seminar):	2-day seminar
Sponsor:	Province of New Brunswick
Target Groups:	Consultants/Contractors affiliated with Engineering Association
Delivery Agent:	New Brunswick Energy Secretariat
Purpose:	Increase awareness and provide information on industrial and commercial ventilation and air-handling systems.
Content:	Not available. Industrial and commercial application. Tours provided.
Length; Frequency:	Two day seminar, normally once a year, as demand and available funding dictate. Available on January 21-22, 1985.
Certificate; Diploma:	None
Principal Contact:	Mr. Maurice Robichaud, Director of Communications, New Brunswick Energy Secretariat
Cost:	N/A
Critique:	New and retrofit ventilation systems are addressed on a general basis. Not directly applicable to apartment sector or building manager/operator audiences.

In co-operation with the Professional Development Committee of the Association of Professional Engineers of the Province of New Brunswick, the Ener$ave program is planning 2, two-day technical seminars for engineers in energy conservation technologies. The first seminar, "Energy Conservation in Commercial and Institutional Buildings" will be on December 8 and 9 at Hotel Beausejour, Moncton. Topics covered will include: New Building Design Techniques, Retrofit of Existing Buildings, Energy Conservation Opportunities in Lighting, Energy Conservation through Building Management Systems, Computer Programs for Buildings Systems Analyses, Energy Considerations in HVAC Systems and Energy Conservation Features at Market Square, Saint John. The second seminar, "Energy Conservation and Industry" will be held in January 12 and 13 at the Delta Brunswick Hotel, Saint John. Topics for this seminar will cover refrigeration, boilers and heat recovery. Fifty participants are expected at the December and at the January meetings.

PROGRAM/COURSE/WORKSHOP

TARGET COMMUNICATIONS (ENERPLAN CONSULTANTS)

Title:	N/available
Geographic Area:	Ontario
Type (Course, Seminar):	Several tailored seminars dealing directly with building energy technology
Target Groups:	Managers, Owners, Superintendents
Delivery Agent:	Target Communications 250 The Esplanade, Suite 301 Toronto, Ontario M5A 1J2
Purpose:	N/available
Content:	N/available
Length; Frequency:	2 days (average)
Certificate; Diploma:	None
Principal Contact:	Greg Ross (416) 364-1829
Cost:	Depends on duration
Critique:	There is no specific seminar material available; rather they will prepare seminars on request (for a fee). Energy measures are covered with respect to envelope, mechanical systems and building operator/tenant interrelationships.

Target Communications 250 THE ESPLANADE, SUITE 301, TORONTO, ONTARIO M5A 1J2 (416) 364-1829

October 15, 1984

Ricardo Garezabal
Energy Sciences Division
ONTARIO RESEARCH FOUNDATION
Sheridan Park Research Community
Mississauga, Ontario
L5K 1B3

Dear Ricardo:

RE: TECHNICAL SEMINARS AND WORKSHOPS RELATED TO EVOLVING APARTMENT OWNERS' OR OPERATOR'S MANUAL

This is in response to your telephone call and request for information with respect to the services and facilities offered by our firm in connection with the matter captioned above.

Target has produced and packaged technical information in a variety of forms, including slides, overheads and video presentations, and organized, managed and delivered seminars and workshops, (see sample flyers enclosed).

The majority of our pertinent work to date has been in developing the material for half day, one day or, more commonly, two day workshops, which we then have delivered to sales and service personnel of gas utilities; fuel oil dealers or groups thereof, and co-operative housing and condominium groups. The focus of these workshops has been in two distinct areas. These are new mid and high efficiency equipment and on-going research and development, (ie. future prospects; and, the building or development complex **as a system**). The latter addresses the three basic systems that comprise a building or complex, envelope, mechanical and occupant or operator, and their interrelationships. Our presentations also emphasize the linkage between building sciences and energy management.

Our pre-packaged presentations, to date, are, generally, tailored to a distinct audience. We have not, thus far, offered seminars or workshops to any target group(s) without first having signed a contract with a client to undertake the program.

.../2

Target Communications

Target Communications is very much interested in continuing and expanding this service. Currently however, we would only undertake this work under sponsorship, (eg. BETT funds), or under contract with the target group(s).

Please call if you have any further questions or if we can be of any further assistance.

Yours sincerely,

Greg Ross
Managing Director

GR/ae

PROGRAM/COURSE/WORKSHOP

ENGINEERING INTERFACE/Chalifour Marcotte

Title:	Vocational Development for Building Administrators
Geographic Area:	Toronto and Montreal; other Canadian locations if demand should dictate.
Type (Course, Seminar):	Seminar
Target Groups:	Building Owners, Property Managers
Delivery Agent:	Bob Tamblyn and Tom Tamblyn of Engineering Interface Ltd. and also Chalifour, Marcotte et Associes Inc.
Purpose:	The individual will be able to set-up and implement Energy Management Programs.
Content:	Addresses different techniques of energy conservation applicable to public, commercial and industrial buildings
Length; Frequency:	3 day seminar, offered as demand dictates
Certificate; Diploma:	None
Principal Contact:	Tom Tamblyn
Cost:	$495.00 per seminar
Critique:	The program points out specific energy conservation techniques along with the development and implementation of energy management strategies. Offered in French by Chalifour, Marcotte et Associes Inc.

PROGRAM/COURSE/WORKSHOP

ENGINEERING INTERFACE/Chalifour Marcotte

Title:	Vocational Development Courses #1 to #5
Geographic Area:	Primarily Ontario and Quebec
Type (Course, Seminar):	Seminars
Target Groups:	Technical Staff
Delivery Agent:	Engineering Interface/Chalifour Marcotte et Associes
Purpose:	The student will be able to carry out different energy conservation techniques applicable to the building envelope and equipment.
Content:	Individual areas for energy conservation are addressed. Included are HVAC and electrical systems, building envelopes, and automated energy management systems.
Length; Frequency:	Three days/seminar; 5 seminars in total. Offered as demand dictates
Certificate; Diploma:	None
Principal Contact:	Tom Tamblyn
Cost:	$495.00/seminar
Critique:	Seminars discuss the theory of each area of building maintenance and operation to supplement hands on experience. Offered in English by Engineering Interface and in French by Chalifour, Marcotte et Associes Inc.

cma

Training for use of the ESA software, 1978

Given by CMA, this five-day session, requested by Public Works Canada, was to teach the consultants the use of the ESA software.

Vocational development course # 1

This three-day session was designed by CMA for the personnel in charge of the operation and maintenance of ventilation and air conditioning systems in public, commercial and industrial buildings.

Vocational development course # 2

This three-day session was designed by CMA for the personnel in charge of the operation and maintenance of electrical systems in public, commercial and industrial buildings.

Vocational development course # 3

This three-day session was designed by CMA for the personnel in charge of the operation and maintenance of heating and cooling systems in public, commercial and industrial buildings.

Vocational development course # 4

This three-day session was designed by CMA for the personnel in charge of the operation and maintenance of the building envelope of public, commercial and industrial buildings.

. . . /3

Vocational development course # 5

This three-day session was designed by CMA for the personnel responsible for the selection and operation of central computerized systems in public, commercial and industrial buildings.

Special vocational development course
for building administrators

This three-day session was designed by CMA to teach the administrators and managers the different techniques of energy conservation applicable to public, commercial and industrial buildings.

Special session designed for the City of Chicoutimi, 1983

A three-day course to the city employees covering the basic energy conservation techniques.

Hydro-Québec

1. Training seminar on energy audits for the Energain program (single-family dwellings, duplex and triplex). This was a ten-day session given to the Energain representatives of the province of Québec.

2. Ten-day seminar on energy audits in buildings of four to twenty apartments given to Energain technicians. We have also developed a software for this audit.

3. A ten-day course on electrical and mechanical systems for Hydro technicians.

. . . /4

CMA Chalifour, Marcotte et Associés Inc.
Conseillers en économies d'énergie

83, place Frontenac
Pointe-Claire, (Québec)
H9R 4Z7

(514) 694-4141

Kurt Alder, ing.
Hani A. Bazerghi, Ph.D., ing.
André Chalifour, ing.
Guy M. Dubois
Guy Festa, ing.
Yves Léger, ing.
Pierre Marcotte, ing.
Laurier Nichols, ing.
Robert Patenaude, ing.
Jean-Claude Provost, B. tech.

cma

Pointe Claire, October 11th, 1984

Mr. Ricardo Gardeazabal

Ontario Research Foundation
Engineering Division
Sheridon Park Research Community
Mississauga
Ontario
L5K 1B3

Dear Sir:

As requested, please find enclosed an explanation sheet on each course given by C.M.A.

TECHNIQUES D'ECONOMIES D'ENERGIE
DANS LES BATIMENTS EXISTANTS

- Guide du gestionnaire
- Systèmes de ventilation et de conditionnement de l'air
- Systèmes électriques
- Systèmes de chauffage et de refroidissement
- Enveloppe architecturale des immeubles
- Systèmes de commande par ordinateur

Two other courses are in preparation:

- Heat Exchanger for March 1985
- Preventive Maintenance for September 1985

If you have any further questions, please do not hesitate to communicate with us.

Yours truly,

CMA CHALIFOUR, MARCOTTE ET ASSOCIES INC.
Energy Management Consultants

Pierre Marcotte, Eng.

PM/jp

PROGRAM/COURSE/WORKSHOP

MEDICINE HAT COLLEGE

Title:	Energy Management on High Energy Use Buildings
Geographic Area:	Available Canada-wide
Type (Course, Seminar):	Material for Energy Conservation Workshops (consisting of 11 video cassette tapes)
Target Groups:	Property Managers and Owners
Delivery Agent:	Tapes may be purchased from Medicine Hat College as educational material
Purpose:	The individual will be able to set-up and implement Energy Management Programs
Content:	Energy planning and strategies; video tapes of energy workshop
Length; Frequency:	11 tapes, 60 mins each
Certificate; Diploma:	Organizations may issue own certificate
Principal Contact:	Mr. Scarlett
Cost:	$2,150.00 per set of 11 tapes
Critique:	Tapes have been purchased by Ontario Hydro, Quebec Hydro, Southern Alberta Institute of Technology

Establishing an Energy Management Program Is One of the Best Low Risk, High Return Investments You Can Make.

If you are a building owner, operator, contractor or designer, this energy management series will help you identify and qualify the use of energy in large buildings. The course offers you and your staff practical suggestions for energy conservation. Members of energy management committees and those involved in energy management education will find it an ideal resource. Instructors at colleges and technical schools can select programs to inject the energy saving concept into many of their existing courses.

The series *Energy Management for High Energy Use Buildings*, filmed during a recent seminar at Medicine Hat College, consists of eleven ¾" colour videocassettes and a reference manual. Programs vary in length from sixteen to fifty-three minutes for a total of approximately six and one-half hours.

Energy Management for High Energy Use Buildings

11 Colour Videocassettes and Reference Manual

Energy Management Planning.
EM 8201
53 minutes

The key ingredient to an effective management program is an energy management plan — your blue print for action. How to start a plan, obtaining management support, developing a team, staging audits, identifying opportunities for savings, promoting and implementing the plan, monitoring and updating.

The Energy Audit
EM 8202
32 minutes

One of the initial steps for an energy management program. A practical discussion of building profiles, utility audits, the audit team, the walk-through audit, tools, what to look for, and the use of consultants.

Energy Conservation Potentials
EM 8203
29 minutes

What you determine as a result of the energy audit. This program discusses recreation centres, stratification, negative pressures, existing and new building energy use, domestic hot water, ventilation, dead-band controls, economizer cycles, atriums and the effect of building shapes.

HVAC Controls
EM 8204
43 minutes

This is an excellent introductory program on the hows and whys of various control systems: electric, pneumatic, electronic, electronic-pneumatic and direct digital. Types of control action and control technology are also covered.

HVAC Systems
EM 8205
29 minutes

This program covers all air systems, reheat, variable air volume, dual-duct, multizone, air-water, all water, roof top units, heat recovery equipment and discusses choosing a system.

The Psychrometric Chart
EM 8206
40 minutes

The psychrometric chart is the basic tool of the heating, ventilating and air conditioning industry. This introduction includes a description of the chart and how it is used for the heating, cooling and mixing of moist air.

Psychrometric System Analysis
EM 8207
31 minutes

The value of the psychrometric chart is well demonstrated in this program on the chart's use to analyze HVAC systems, economizers, enthalpy problems and reheat systems.

HVAC Energy Saving Opportunities
EM 8208
28 minutes

A practical discussion of low-cost, no cost savings, changing to a variable air volume system and the benefits of control updating.

Energy Management Control Systems
EM 8209
16 minutes

It seems as if a new energy monitoring and control system appears everyday. This is a down to earth lecture on the advantages and disadvantages of energy management systems — what to expect from them and what precautions to take when choosing one.

Applied Lumen Conservation
EM 8210
52 minutes

An introduction to lighting design, the new IES standard, types of lighting sources and fixtures, efficient use of lighting, daylighting and lighting maintenance.

Building Operation and Maintenance
EM 8211
31 minutes

The last program in the series is a good general lecture on the benefits of a well designed maintenance program, how to keep it functioning and many practical pointers from a person who's been in the maintenance game a long time.

The Instructional Team:

Ken Kent

One of Canada's outstanding energy consultants and President of Moffat Engineering Ltd., a Toronto based firm of engineering consultants.

Ken is actively involved in many energy-related associations and is a frequent lecturer at Energy Management seminars across Canada.

Bob Stan

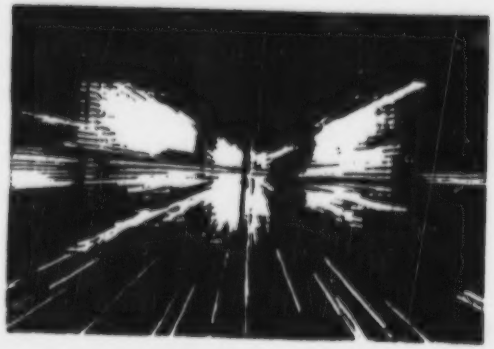
A consultant in the design and specification of heating, ventilating, air conditioning and energy management systems. Bob was in the United States Air Force designing HVAC systems and was an associate professor at the Air Force Institute of Technology.

He is currently the President of Stan and Associates Engineering Consultants in Dayton, Ohio.

Michael Aimone

Mike is an electrical specialist who has spent many years in electrical design and maintenance with the United States Air Force and is presently a senior electrical engineer in that organization.

He is a well known lecturer and was formerly a program co-ordinator for the University of Wisconsin, Department of Applied Sciences.



This energy management course was prepared with the financial assistance of Energy, Mines and Resources, Canada. A committee of the gas and electric utilities of Alberta and the Department of Energy and Natural Resources assisted with the course content.

Purchase

Rental

Continuing Education Department
Medicine Hat College
299 College Drive
Medicine Hat, Alberta
T1A 3Y6
(403) 529-3844

PROGRAM/COURSE/WORKSHOP

Bell Canada

Title:	Bell Canada has an Operational Training Facility for In-house Building Operations staff.
Geographic Area:	Toronto
Type (Course, Seminar):	In-house training facility
Target Groups:	Not available to the public
Delivery Agent:	
Purpose:	
Content:	
Length; Frequency:	
Certificate; Diploma:	
Principal Contact:	Mr. A. Borecki - Instructor 599-4899 Mr. D.W. Lang - Director 599-2079
Cost:	
Critique:	They have an internal program for hands-on and classroom training of their office building operators. Should a training facility for apartment building operators be established, the Bell Canada facilities might prove valuable as a model.